

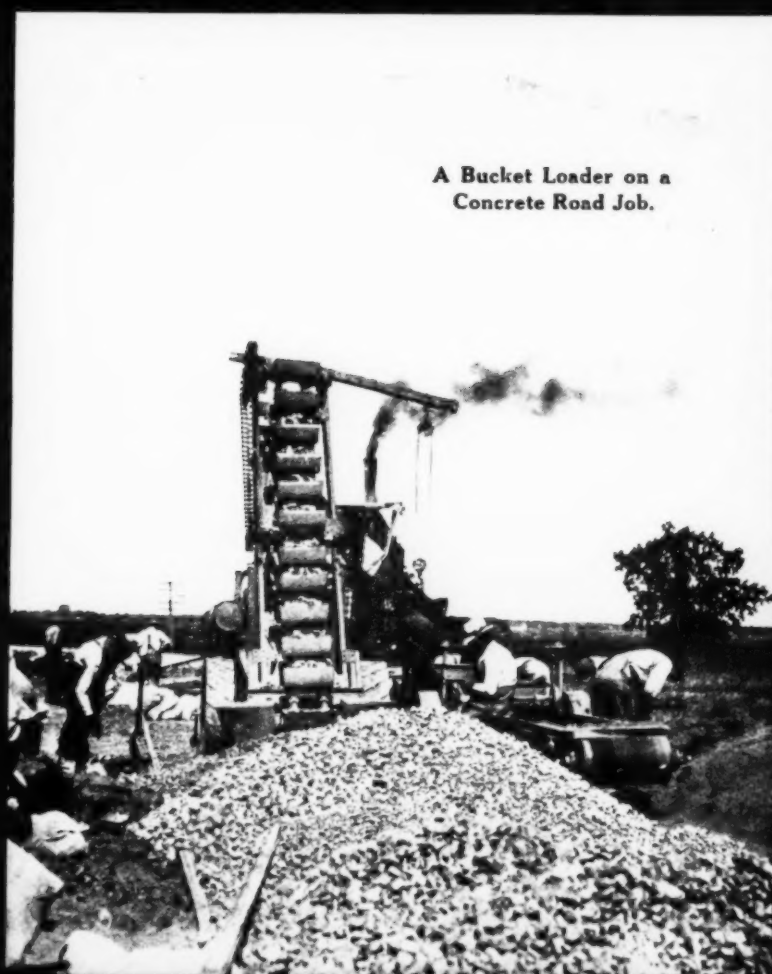
# Successful Methods

CONSTRUCTION · ROAD MAKING · ENGINEERING · INDUSTRIAL · MINING

VOL. 1

NOVEMBER 1919

No. 5



*In this issue*

**LIFTING ILLINOIS OUT OF THE MUD  
FINANCIAL STATEMENTS—AN AID  
IN PROCURING CONTRACTS**



## The River-Lock And The Part It Plays In The Life Of Your Shovels

Here's an exclusive Wyoming feature—a method of handle construction which means much to shovel buyers.

Here's a rivet construction that strengthens the handle instead of weakening it—a pair of rivets locked together to keep your shovel handles strong. Note the rivets at the left—the teeth on each that engage. And the burrs up near the head.

Here is what these rivets do:

Even the best northern white ash (proved by years of testing the best wood for shovel handles) will expand in damp weather. Ordinary rivets with no teeth to lock are pushed out of the wood and stay out when the wood contracts. This not only weakens the handle but hampers the shoveler; cuts his hands and rips his clothes.

The Wyoming rivets are locked—steel teeth engaged like gears. No expansion of the wood can budge them. And contraction only strengthens their grip. Thus expansion is absolutely prevented, eliminating all possibility of the wood checking.

This one feature (only a detail in Wyoming construction) insures 50% added shovel life.

This is only one of the many reasons why you should buy Wyoming Shovels. Look for the shovel with the Red Edge, a mark for your protection.



### THE WYOMING SHOVEL WORKS

NEW YORK  
165 Broadway

ATLANTA  
1405 Candler Bldg.

CHICAGO  
347 Peoples Gas Bldg.

SPOKANE  
336 First Ave.

PHILADELPHIA  
1234 Commercial Trust Bldg.

SAN FRANCISCO  
268 Market St.

BOSTON  
118 Pearl St.



# The WYOMING SHOVEL WORKS



# Successful Methods

## *A Magazine of Construction Service*

Published by  
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Vol. I

November, 1919

No. 5

### SERVICE OR SALES?

This construction service idea keeps jumping along so fast that Successful Methods may have to consider turning itself into a weekly in order to furnish its readers with the last minute news. Here's the latest version of construction service, the interpretation being that of a large manufacturer of concrete mixing and placing equipment.

The villain of the piece was a contractor. (That doesn't sound reasonable but we can't alter facts.) He bought the concreting equipment and then rigged it up on an insecure tower in such fashion that it could not be operated safely and efficiently.

The manufacturer, following up the sale with his usual service, discovered the faulty installation and advised the contractor to remedy it. When the advice was ignored, it was replaced by a request and when that was refused a demand was the next step. But the contractor still was obdurate. If the outfit didn't work right he would be the loser and that wasn't anybody's business but his own.

The old time manufacturer would have let it go at that—even if he got that far. Not the manufacturer with an ideal of construction service, however. Almost before the balky contractor knew what was happening the equipment was removed at the manufacturer's expense and about all he had left was his shaky tower and a sense of shocked surprise. He passed up an opportunity to profit by the friendly help of the manufacturer.

That's the story and every word of it is true.

This manufacturer first of all had a reputation to maintain. The profits on any one job didn't count with him if that reputation were injured in the slightest degree. So he stuck to his standard and chucked the profits. He isn't worrying over the "Service or Sales" question. "Service before Sales" is his answer.

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*This Magazine Will Be Sent to Men Who Can Use It.*

*This Issue Has More Than 75,000 Circulation.*



## EDITORIALS

### Highway Highlights

**I**T is estimated that the national system of roads to be constructed by the government within the next few years will consist of approximately 60,000 miles of improved road. The various states will improve an additional mileage of 250,000. These will be high grade roads. Counties and townships will construct or improve approximately 300,000 miles. When this is all done there will be 1,800,000 miles of earth roads yet unimproved.

The national system will cost approximately two billion; the state systems, six billion; the county systems, six billions; and the earth roads, three billions; making a total of seventeen billion dollars to be spent to provide an adequate highway system in the United States.

In 1918 a quarter of a billion dollars was expended on roads. In 1919 nearly a half billion will be expended. If the present rate of expenditure is continued, more than thirty years will be required to finish this road system, and in that period the roads made first will all be worn out and have to be built over again.

These figures are staggering unless we consider the benefits that will accrue from the system of roads. Modern business and living conditions require hard, wide highways. It has been estimated that the loss to the country due to the lack of such highways at the present time is many times the cost of construction.

These figures give some conception of the hugeness of the highway problem. There is not a sufficient amount of labor in this country to complete these roads and carry on other business of the nation at the same time unless some way is devised to increase the production of men engaged in highway work. The answer is the use of machines that increase the production of men.

The editor recently visited a large highway job on which not a single horse was used. Grading tools, hauling machinery and all other machinery in use there were handled by gasoline and steam engines.

### The Family Tree of Knowledge

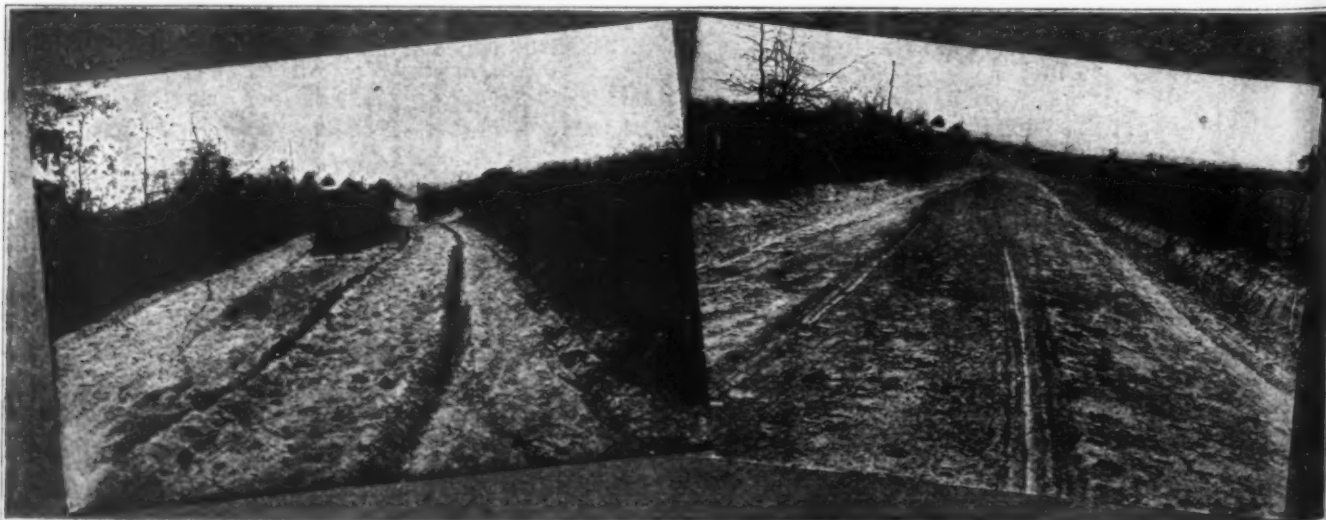
**"S**EVERAL years ago a noted engineer planned extensive improvements to correct an apparent defect in the water supply system of a city in Washington," says Halbert P. Gillette. "It was thought that by no other means would the accumulation of decaying algae be disposed of. Another more observing man noted that when the reservoir overflowed this accumulation disappeared. By installing a system of overflow pipes to fit various water levels the trouble was overcome."

All knowledge is founded upon little things and from observation of many little things a principle that applies to all is developed. This principle combined with other principles similarly developed enables us to evolve a master principle. It is like a family tree, the roots of which are Divine knowledge. Without a knowledge of the little things upon which the principle is founded, the principle can not be accurately applied. This is the difference between theory and practical knowledge. For this reason **SUCCESSFUL METHODS** deals with little things.

Progressive manufacturers realize the importance of little things in the successful operation of machines they sell. A contractor recently showed a proposed plant layout to an experienced sales engineer. His suggestions resulted in a reduction of the amount of equipment to be bought, a saving of money and, as it turned out, a greatly increased production.

### A Contractor-Landlord

**A** SEWERAGE contractor in Iowa was working in a town where the average board and bed for laborers cost \$7 per week. When he imported 12 extra men the profiteering boarding house keeper increased the rate to \$9.50. The men balked and wanted to jump the town. The contractor overcame this difficulty by renting a house and setting the men up in bachelor quarters. The house cost \$12 a month rent which the contractor paid in order to keep the men satisfied.

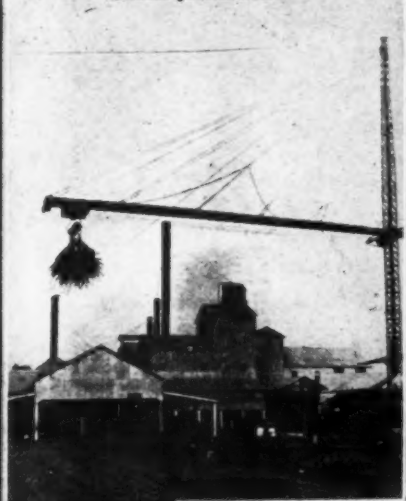


SAND ROADS IN TEXAS



# DERRICKS ARE EVERYWHERE

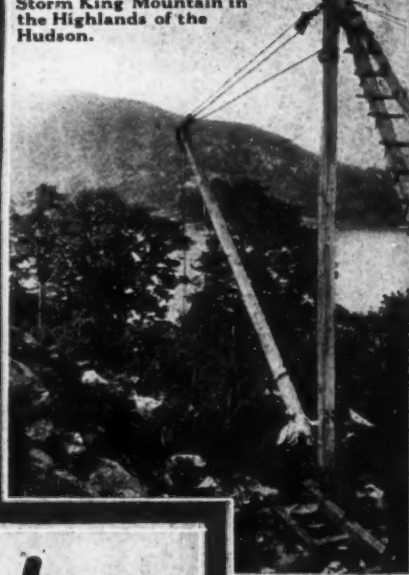
Picking up sugar cane on a Cuban plantation.



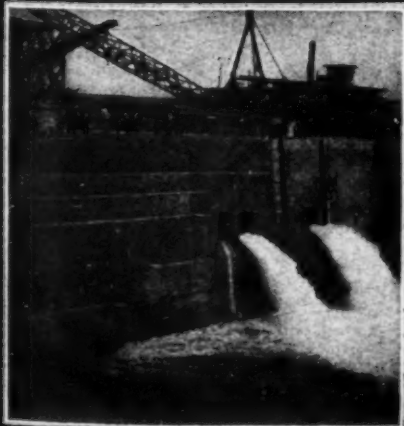
Stretching into the sky on a powerhouse job in New York City



Helping to build the State road around the shoulders of Storm King Mountain in the Highlands of the Hudson.



A stiff leg derrick hard at work in the logging country.

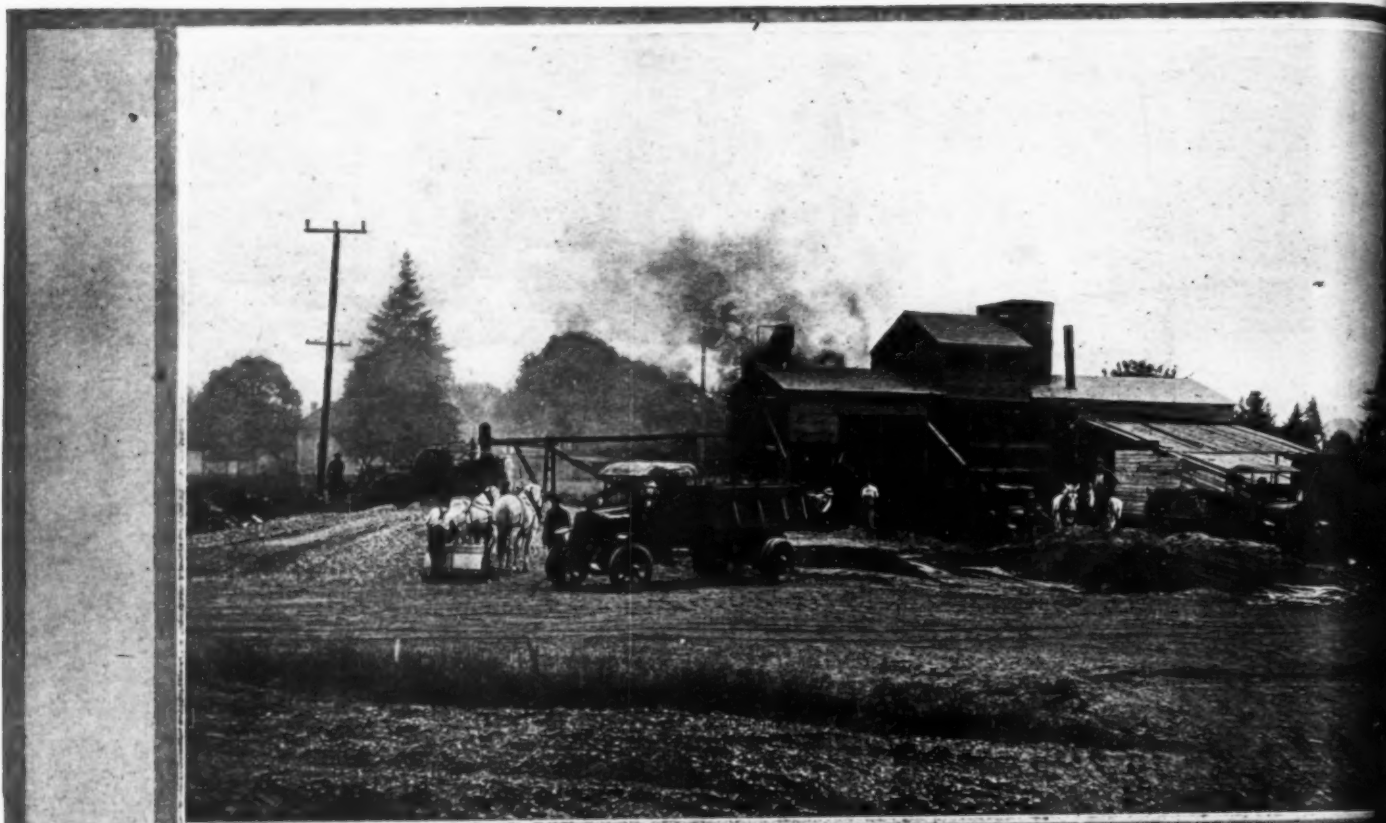


Letting the water into the Pearl Harbor dry dock at Honolulu while the derricks enjoy a well-earned rest.



This California granite quarry is full of derricks. Those in the photograph are only a few of the family.

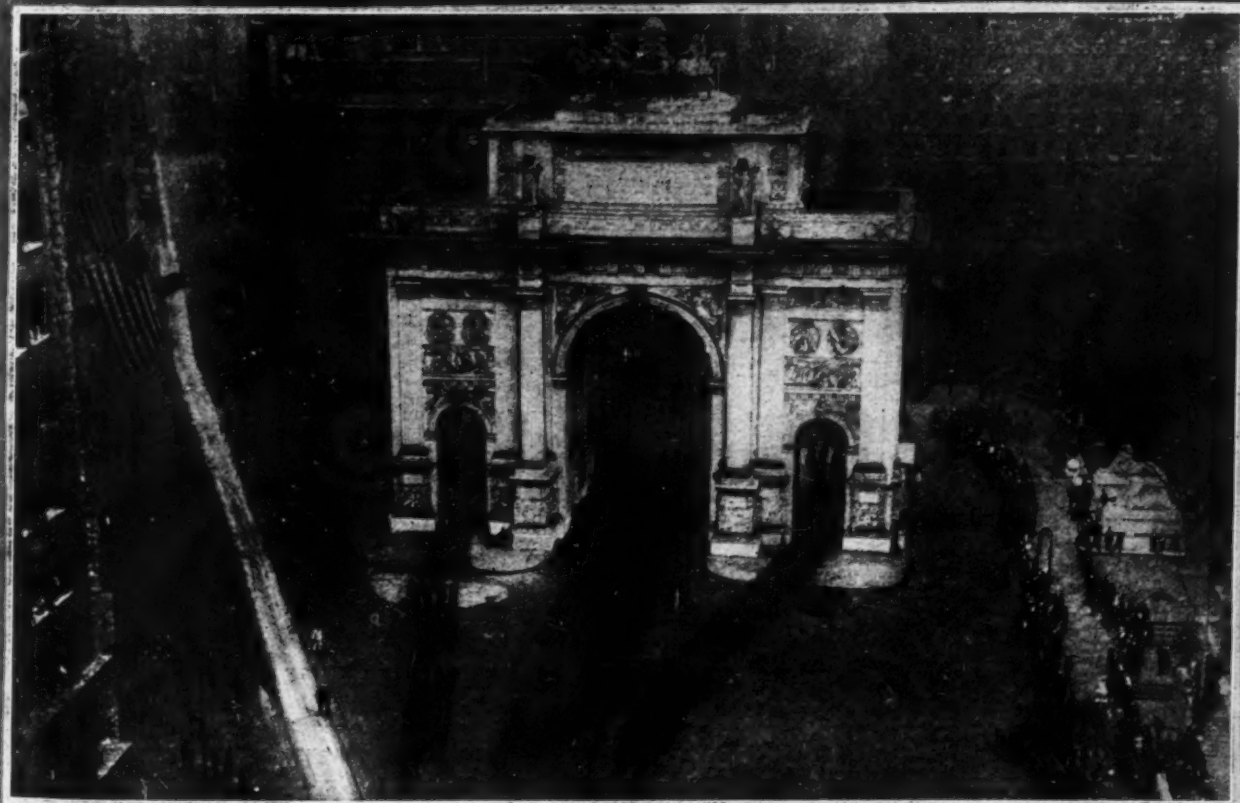
## Machines Build Western Roads



Marion County, Oregon, does its own road building. The upper photograph shows the work in progress with up-to-date machinery on the job. Below, a section of finished asphaltic concrete road stretches away over the hills. The photographs were furnished by W. J. Culver, Roadmaster.



## And Repair Eastern Streets



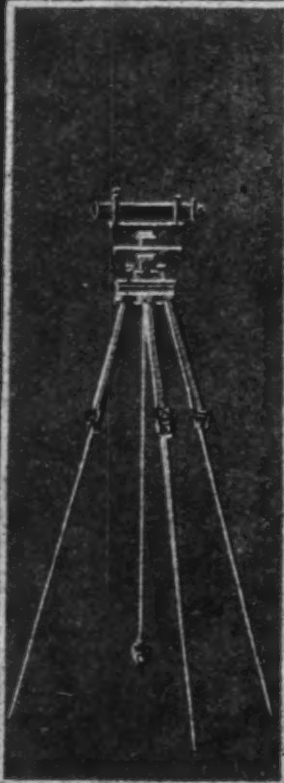
On the eve of the big parade in New York City unfinished work on Fifth Avenue threatened to mar the brilliant spectacle. Under the glare of acetylene lights shown in the upper photograph, the work was finished in time. Below, Pershing's troopers are shown marching through the Victory Arch at Madison Square.



## ROAD BUILDERS



When Irving W. Patterson completed his course in civil engineering in 1905, he entered the office of the State Board of Public Roads of Rhode Island as a draftsman. His work in this capacity won for him several promotions and he served the Board successively as designer, office engineer, testing engineer and resident engineer within the next five years. In 1913 he was appointed to the post of Chief Engineer of the State Board of Public Roads, the position which he still holds.



Col. William D. Uhler was appointed Chief Engineer of the Pennsylvania State Highway Department in 1915. He procured a leave of absence from the Highway Department early in 1918 and was commissioned Major in the Motor Transport Corps. Later he was promoted to the rank of Lieutenant Colonel in charge of the operations division. He also represented the War Department on the United States Highways Council, and acted as assistant to Major General Goethals on all highway matters.



W. S. Keller, State Highway Engineer of Alabama, engaged in private engineering practice from the time of his graduation from the University of Alabama in 1893 until 1900, when he was appointed First Assistant Engineer of the Shiloh National Military Park. He resigned in 1905 to become Chief Engineer of the Madison (Tennessee) County Good Roads Commission, and was appointed State Highway Engineer of Alabama in 1911 with reappointments in 1915 and 1919.



M. W. Watson, State Highway Engineer of Kansas, was born at Racine, Ohio, April 30, 1890. He was appointed Junior Engineer of the Illinois State Highway Commission in 1912 and Assistant Road Engineer in 1915. Appointed Road Engineer of the Kansas Highway Commission in 1917. Served as Acting State Highway Engineer of Kansas from July 15, 1918, to June 1, 1919, when he was appointed to this office and is now in charge of the entire road and bridge work of Kansas.

## LIFTING ILLINOIS OUT OF THE MUD

### From Mire to Hard Surface at the Rate of Half a Mile a Day

By JAMES W. BROOKS

ALMOST every variety of equipment and method of handling concrete road work is in use on the mud link between Springfield and Peoria, Ill., a distance of a little more than 60 miles, which is being replaced at the rate of one-half mile per day with concrete. The work has been divided into approximately 5-mile sections and a number of contractors are on the job, some of them taking but a single section.

The road lies for the most part over moderately rolling country, although at some places 8 to 10 per cent grades are encountered. The average amount of grading per mile is approximately 6,000 cu. yd. The engineering is excellent. The roads of Illinois for the most part follow section lines, but there are frequent jogs and many right angled turns. Where the roads have jogged from a few rods to an eighth of a mile, new locations have been made, putting in gradual reverse curves.

A number of concrete bridges are in course of construction. In many cases the larger bridges are at new locations in order to straighten the line of the road.

A 1, 2, 3 mix is laid 7 in. thick at the sides and 8 in. at the center. On all the jobs steel forms are used. On two of them the forms are 7 in. high, while on the others 6-in. forms laid on 1-in. boards are used. This latter method seems to work out better.

On all the jobs finishing machines are in use. Of the eight inspected, all the foremen but one reported that their machines were working satisfactorily. The one dissenter had just begun work and did not have an operator who had fully mastered the machine. To work most



efficiently enough concrete should be placed in front of the finisher to permit the strike-off to spread the concrete a uniform grade, thus leaving a uniform amount of concrete to be tamped. Otherwise the surface may be a little low in spots and it may be necessary to shovel material back upon the partly finished road to bring it to the proper shape. This

is done readily, but is additional work.

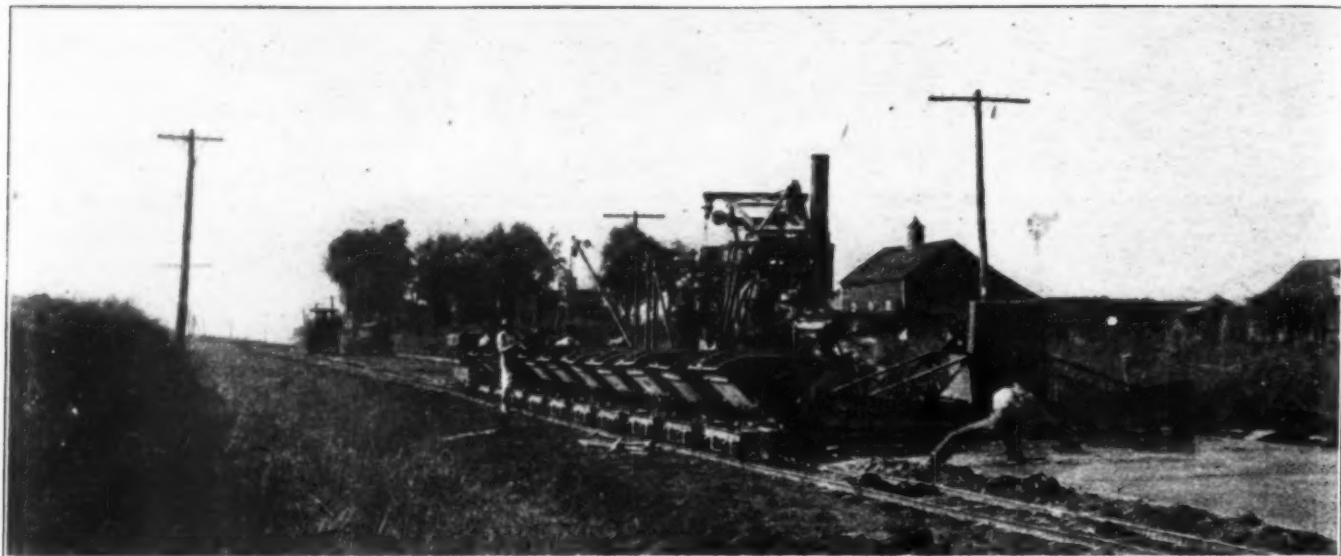
The machines work better with a rather dry mix. If too much water is used it remains on the surface and is harmful. If the machines are operated so as to drag the belt over the surface of the road much of the excess water is removed from the finished portion. On most of the sections cotton-covered frames protect the concrete.

The methods of hauling display much more variety. Jansen & Shaefer contractors, haul their material with government trucks, assigned to the state, about one mile dead haul. Materials are delivered on the sub-grade and handled to the mixer with a loader. The mixer is laying about 300 feet per day. A canvas cover and wet earth are used in curing. The mixer has a boom and bucket.

On Section H, Bates & Rogers, contractors; Frasher & Davis, sub-contractors, the materials are delivered by industrial track provided with removable wooden boxes, two to a car, holding 1 cu. yd. no dead haul, and using a 3½-ton gas engine. The boxes are handled with a derrick attached to the mixer.

On Sections G and P, Bates & Rogers, contractors, the materials are delivered over 2-ft. gauge track laid on 2-in. plank stringers, which seem to give excellent support. Boxes hold a 4-bag batch, 3 to a truck and the haul





MIXER AND TAMPING MACHINE AT WORK. MATERIAL DELIVERED OVER INDUSTRIAL TRACK

ing is done by a small steam locomotive. A derrick, mounted on wheels, handles the boxes to the mixer.

On Section 15D, Bates & Rogers, contractors, the set up is unusual. The materials are delivered by trucks which carry 2 to 3 cu. yd. boxes. Some are loaded with sand, others with the coarse aggregate. The mixer is mounted on a large timber frame approximately 12 by 12 ft. square at the base and 15-20 ft. high. This frame carries the 4-sack batch mixer and 2 hoppers, 3 to 4 yd. capacity each. A derrick handles the boxes brought by trucks to the hoppers. There are smaller hoppers provided so that the materials may be measured as they go

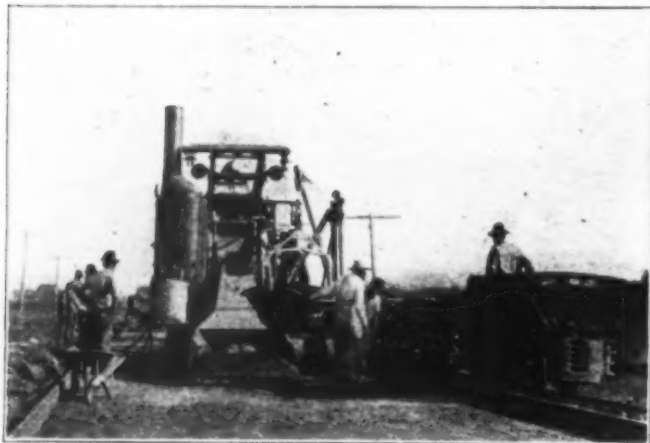
200 ft. The method of delivery and handling of the materials was the same as on Section 15D.

On Section C, Bates & Rogers, contractors, deliver materials by trucks upon sub-grade, handled by wheelbarrows to the mixer. About 15 men were in front of the mixer. An especially good foreman seemed to be in charge of this section. He reported 184 ft. laid in 4 hours and expected to put in about 400 ft. a day.

On Section B, also by Bates & Rogers, the materials are hauled in trucks delivered on the sub-grade and handled in wheelbarrows to the mixer. Thirteen men were seen in front of the mixer working with wheelbarrows. This section is 18 ft. wide, laying 175 ft. per day.

Section N, Nelch & Company of Springfield Ill., contractors. They are hauling materials by trucks delivering upon sub-grade, handling with wheelbarrows to the mixer. The section of road is 18 ft. wide, and the contractors are placing about 120 ft. per day.

The appearance of the jobs which handle the materials by an industrial track and thence into the mixer furnishes a great contrast to those on which materials are delivered on the sub-grade. In the summer months little trouble was experienced, but with the advent of rainy weather the contractors on those jobs depending upon trucks running over the Illinois earth roads face the prospect of being closed down for days at a time.



FROM CAR TO MIXER

into the mixer. A lower platform just above the mixer drum handles the cement.

To haul this arrangement which is carried by this timber structure, a track is provided and the whole pulled ahead by a steam roller, moved from 500 to 1,000 ft. at a time. The concrete is delivered to small gasoline operated buggies which operate over the sub-grade to the point where the concrete is being laid. This outfit is making about 200 ft. per day, the greatest amount being 278 ft. Seven men were counted on the mixer frame.

One other section, D, handled by the same contractors, is operated in a similar way. On this job the best run was 311 ft. per day, averaging a little under



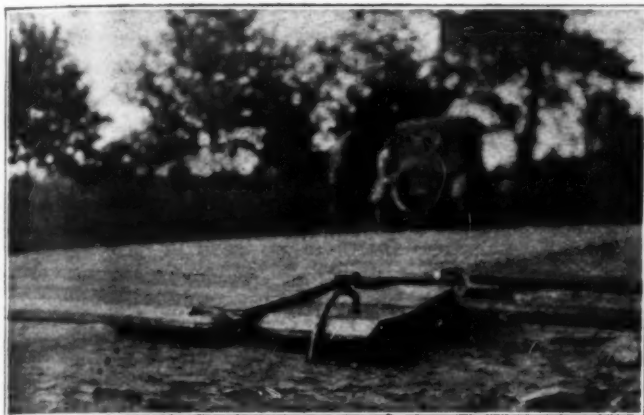
THE FINISHED PRODUCT



## PIPE GOES OVER THE TOP

### Anti-Noise Crossing Works Well on Brick Highway

IN piping water to a construction job on the Highland Road near Cleveland, Ohio, Masters & Mullen, contractors, found it necessary to cross a brick road with the pipe line. The illustrations show how they did it. Two



HOW THE PIPE WENT OVER

2 by 12 in. planks were cleated together as shown and placed on each side of the pipe. The edges of the planks were beveled to reduce to a minimum the shock from passing vehicles and to make an easy crossing. Four iron rods, two on each side of the road, were hooked on one end and driven firmly into the ground. These rods held the crossing securely in place and eliminated any noise caused by machines going over the crossing.

The crossing has been in use for some time and has proved satisfactory.

### BACKFILLER PULLS TRENCH SHEETING

The scarcity of labor is leading to the more extensive use of small power scrapers for backfilling trenches. It is not generally realized by contractors that a backfiller also can be used for pulling the sheeting from a trench after it has been filled. To do this a tripod, with legs 12 to 14 ft. long, is set over the trench and provided with a snatch block through which passes the hauling line from the backfiller to the sheeting timber to be pulled. The operator of the backfiller, aided by one man, can readily pull 16 sheeting planks 12 ft. long in an hour.

### DYNAMITING CONCRETE ABUTMENTS

The following method is employed in breaking up one of the concrete abutments of a bridge that had become undermined, and had fallen into the channel of the stream. The concrete was about 3 ft. thick and 7 ft. wide, and was covered with about 18 in. of water. The wings were sticking up out of the water and obstructed the channel.

The blaster used 40% dynamite on the work, the charge being loaded in this way: 5 cartridges (2 lb.) were simply laid on top of the concrete about the center of the block, 5 more sticks were laid in the groove formed by the junction of each wing with the main body of the block; in all 15 cartridges of dynamite were used. The center cartridge in each group of 5 contained an electric

blasting cap and copper wires connected up all 3 charges. Nothing whatever covered the charges except the 18 in. of water; in other words, there was no tamping or mud-capping.

The shot broke off the two wings and broke the center section in two parts in the middle. The entire cost of the work was \$3.86 itemized as follows:

Dynamite and exploders.....	\$3.36
Blaster's service, 1 hour.....	.50

The blocks left by the blast were small enough to be handled by laborers, and were used as the foundation for a new abutment which was shortly afterwards built. The work was done by W. V. Spencer for the superintendent of highways of the Town of West Almond, N. Y.

### REMOVING LEAD FROM PIPE JOINTS

The chisel used for removing lead from pipe joints should have a cutting edge about two-thirds as wide as the thickness of lead in the pipe joint, and the cutting end of the chisel should be curved so as to form a hook that will reach into the joint and pare off a shaving of lead  $\frac{1}{4}$  to  $\frac{1}{2}$  in. thick. On large pipe (16 in. and up) use an air chisel or an oxyacetylene torch. If the pipe is cut off at intervals and several lengths are raised together out of the trench, the torch method can be more effectively applied than where the pipe isunjointed in the trench.

### A STEAM SHOVEL DIGGING IN

IN digging a hole 30 ft. deep to uncover a leaking pipe line in Grant Park in Chicago, a steam shovel literally dug itself in.

Runways were provided at the side as the shovel got deeper into the ground, two stages being used as shown in the illustration. Material was loaded into trucks and



THIRTY FEET DOWN

hauled to a nearby spoil bank. The ground was of filled-in material of rubbish of all kinds.

The shovel would excavate a place at one end of the hole until lower than the wheels. It would then run down into the low part and excavate the place on which it formerly stood. In filling the hole this process was reversed. As the hole was deepened the spoil was piled on the bank to be convenient for refilling.

## FINANCIAL STATEMENTS—AN AID IN PROCURING CONTRACTS

By DANIEL J. HAUER  
Construction Economist

A DECADE or two ago a contractor who had just finished a large contract upon which no money had been made, and with his plant or outfit tied up so he could not move it, put about \$250 in his pocket and went into an adjoining state to procure a new contract and get another start in his business. By sheer force of character and keen judgment together with diplomacy in talking to and handling the engineer and other officials of the company letting it, he obtained a contract for more than half a million dollars of work. With this as an asset he was able to borrow ample money to get the job under way quickly.

A number of such examples of securing valuable contracts with little or no capital and carrying them to completion upon a shoestring could be cited from the experience of the writer and his friends. It still can be done in some cases, but it is the exception today rather than the rule.

The first step in obtaining a contract under present day conditions is a matter of finance, a setting forth of the contractor's assets. Certified checks must be used for bidding, bonds made to qualify before figuring, and for some public contracts a certificate must be furnished before bidding that a bonding company will make bond should the contractor get the job. There even are cases in which a contractor must show his responsibility to the owner before the contract is awarded.

Finances thus becomes the basis of procuring nearly all contracts, and this means that the modern contractor must look closely after his financial standing in the business world. With ample capital this is seemingly an easy matter, yet many contractors, who possess large capital do not always enjoy the best of credit or possess the financial standing of those with less means, due to the fact that they are not careful of their credit, and think they are always likely to be in a position of meeting their obligations with ease.

Benjamin Franklin told how he borrowed money and built up his credit when he did not need money and could pay cash in order to have a good line of credit extended to him when his needs were urgent. This is a valuable lesson in which all contractors can find profit.

Credit is obtained by two methods today. One is by



*Daniel J. Hauer has been engaged in professional work as engineer, contractor, construction economist and writer for a period of about 30 years. He began his career as an engineer in charge of construction work, later went into contracting and from that to writing and editorial work on engineering magazines. For the last 10 years he has been devoting his time to advising contractors on financial, economic and engineering questions. This is the first of a series of interesting articles that Mr. Hauer will write in the next few months for SUCCESSFUL METHODS.*

means of statements showing assets and liabilities, thus disclosing the net worth of a growing concern. The second method is by means of references. In this last, personal integrity and the esteem and confidence in which a man is held counts for much. In most cases these two methods go hand in hand, and the second is frequently the result of the first. In spite of this it is quite surprising how many contractors refuse to make statements of their financial condition.

Only recently as the writer was giving a statement to the solicitor of one of the large national mercantile agencies, the solicitor remarked upon the fact that a large per cent of contractors refused to make statements with the result that their standing was greatly reduced and their credit limited. Definite knowledge of a man's standing even though he has only a few thousand dollars, has been proved better than meagre information regarding a man who may be worth more.

Take the question of deposits on bids for example. If the check is only a few hundred dollars, almost any contractor can furnish it, but if some thousands are demanded, even the contractor who is conducting a large business may not be able to spare the sum, and must arrange to borrow the money. As this is written, an eastern state is asking for a \$25,000 certified check with a bid. Even if a bidding bond is used instead of a certified check, the bonding company will want to know the financial condition of the applicant.

This likewise is true if a bond must be obtained when a contract has been awarded. If there is a maintenance clause or guarantee to the contract the bonding company will want to know if the contractor is financially strong enough to live up to the contract he is about to make.

If the engineer, architect or owner is careful to whom he lets work, a close investigation will be made of the standing and reputation of the successful bidder. In some cases this is done before bids are asked from contractors. The only way to meet this demand for information is to have carefully prepared reports of a contractor's standing in the hands of commercial agencies and of his banker. A great saving of time will thus be effected.



Money frequently must be borrowed from banks to start new contracts and if close relations are to be maintained with a banker he will demand information in regard to the general business policy of the contractor and what his net worth is from time to time. Some people are not favorably impressed with bank references, while others prefer them. In many cases large contracts have been captured by aid of letters from bankers saying the contractor was able to handle the transaction or else that they were willing to give him financial assistance. In many cases during the world war, the national government demanded information from contractors and their bankers before awarding contracts.

There is a growing tendency among state and city governments to look into such details and some few are asking for this information direct from the contractor. On the other hand most of this information is gleaned from outside sources and frequently to the detriment of

the contractor. Only during the last spring the writer knew of a city refusing to award a paving contract to the lowest bidder on account of meagre information about the financial standing of the contractor.

Thus to obtain contracts the first consideration for a contractor is to set his house in order. He must have financial standing in order to bid, in order to get the contract after bidding, in order to make bond, and in order to purchase plant from manufacturers, especially in lease sale agreements. The making of a financial statement does not mean the actual putting of capital into his business, but it does require the furnishing of accurate and detailed information to insure confidence. Thus indirectly it increases his capital, for by it he may obtain contracts, valuable assets in themselves, and also credit to purchase machines and supplies far beyond what actual capital would supply. It establishes more firmly his position in the business world.

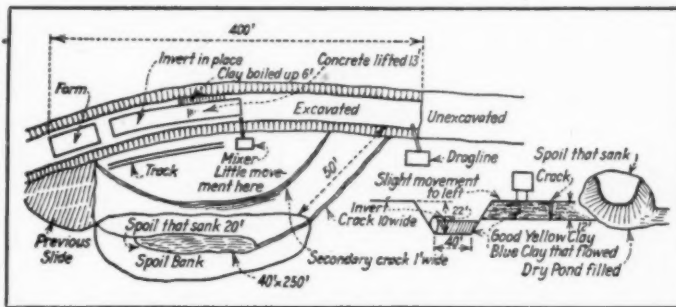
## LESSONS FROM A SEWER UPHEAVAL

### Inverts Lifted 13 Feet in Air by Earth Pressure

**A** PECULIAR upheaval of earth occurred recently during the construction of a portion of the new sewer system of Detroit, Mich. A double trunk box sewer consisting of two 13 by 18 ft. rectangular conduits was begun by excavating an open trench about 22 ft. deep, using dragline

scrapers. Several sections of the inverts were in place when on August 29 at about 3:30 a. m. the ground under the spoil bank sank and in about 3 min. the completed inverts rose up, as shown in the illustrations.

The probable cause of this catastrophe, according to C. W. Hubbell, city engineer of Detroit, was the overloading of the ground under the spoil bank and the vibration due to passing trains on a nearby railroad. This



WHERE THE DAMAGE WAS DONE

is to haul it away and use for back fill as quickly as practicable. With dirt of this kind it is advisable to take out just as little spoil material as possible because the smaller the hole the less danger will result from caving in or shifting of the earth.

Despite the unforeseen delay, construction work is progressing satisfactorily and steps are being taken to provide that no repetition of the trouble occurs.

caused the earth below the hard surface indicated in the sketch to move just as molasses flows.

It would appear that open cut work on soil of this type must be handled with great care and that it is not safe to pile spoil material near the excavation. A safe way to handle this material

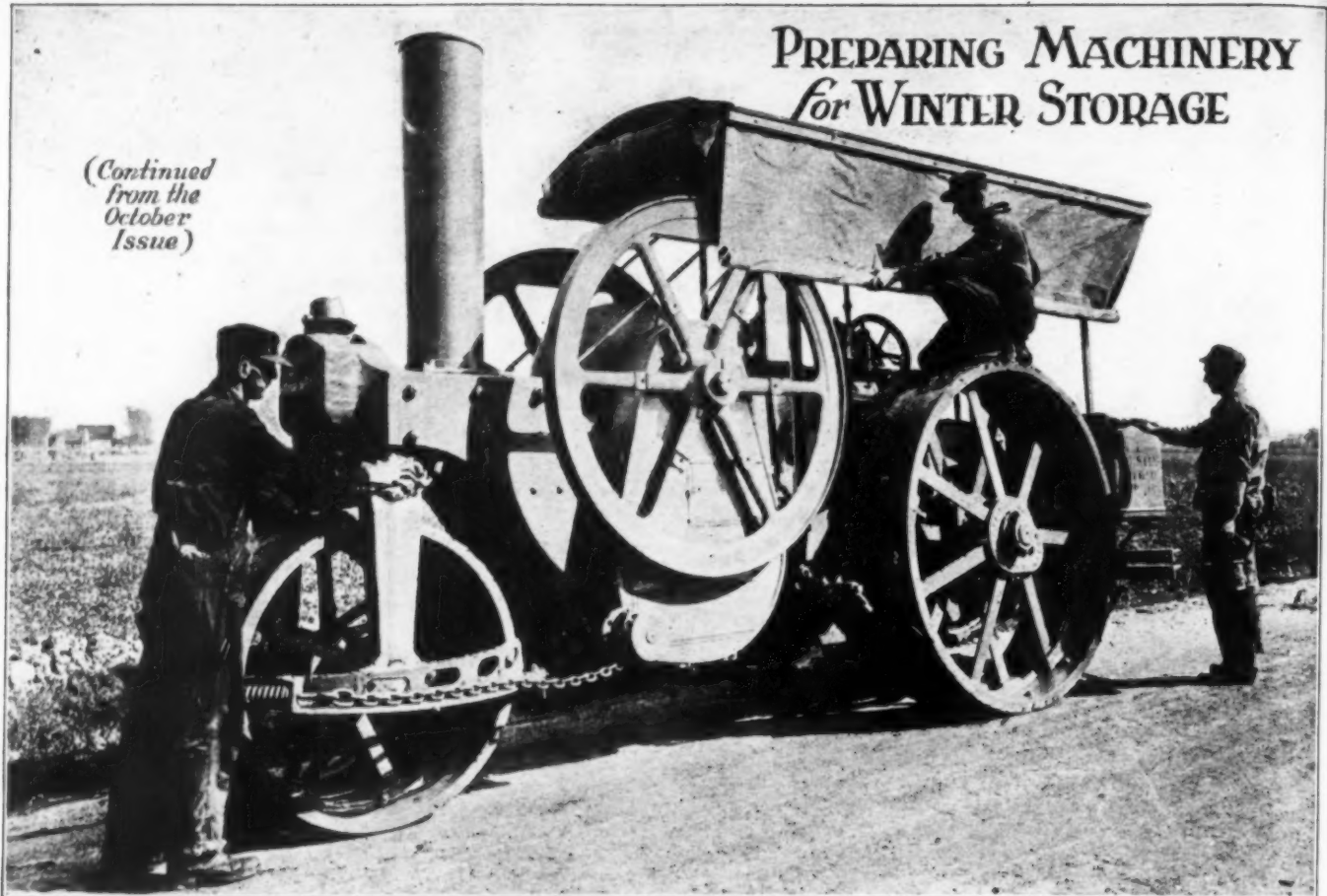


TWO VIEWS OF THE RECONSTRUCTION WORK AFTER THE UPHEAVAL



## PREPARING MACHINERY for WINTER STORAGE

(Continued  
from the  
October  
Issue)



SOME contractors feel that if they lay up a machine for two months in the winter it has had a good rest and therefore should be able to go on the job and do good work in the spring. Likewise, some farmers have the same idea about various implements used in farm work. A hay rake is stored in one corner of the field, the mower in another, the binder behind the barn and the plough in the last furrow. A contractor riding along the road is apt to make sarcastic comments about the way in which the farmer handles his machinery. Yet this same contractor doubtless will forget to make sarcastic comments on the way he handles his own machinery. The farmer also is quite apt to comment on the way contractors take care of machinery. For have you ever seen a road grader standing against the fence along the roadside, a roller or tractor standing in the corner of some one's yard or in a vacant lot, or a crushing plant left in the exact shape it was when the whistle blew at the end of the last day's work?

The men are neglecting their own machinery which, of course, they have a perfect right to do. But with public officials who are charged with caring for and preserving public property, the problem is different and the greatest care should be exercised if they wish to avoid criticism.

Instead of storing machinery, many contractors and officials succeed in storing up trouble, for when spring comes there is a wild scramble to get repair parts and get the machinery in order and generally the scramble continues for some time after the attempted operation of machinery is begun.

In laying up machinery for the fall get it ready for the next spring's operations and avoid the rush that is sure to come at that time. In the fall labor is generally more plentiful and repairs can be made at lower cost

than in the spring. Moreover, the fall is frequently the slack season for the factory which makes road machinery, and for that reason repair parts can be furnished much more promptly than in the spring when the rush of new business is on.

*Road graders* are better stored under cover than out in the open, subject to the weather. Remove all grease cups, singletrees, doubletrees and small parts and put them under lock and key for safe keeping. This rule applies to all the machines hereafter mentioned.

If much worn, the machine should be repainted to prevent material from rusting. All bearings should be left well oiled or greased, as well as all finished or polished parts. It would be a good plan, if grader is left in the open, to remove moldboard and share and put the same under cover after greasing the polished face.

*Elevating graders* are good subjects for a fresh coat of paint, which will do much to increase their life if applied when needed. The carrier belt should be removed, rolled up and placed under cover. The plow should be well looked after. The share and moldboard should be well greased and, if not under cover, it is advisable to protect them by boards or a canvas cover.

*Crushing plants* will do better work in the spring if they get proper care and attention when work ends in the fall. Crushers, elevators and screens should be thoroughly inspected for broken or worn-out parts; and these replaced. Worn babbitted bearings should be rebabbitted. On the crushers the eccentric bearings and bushings should especially be looked after, as lost motion at this point greatly reduces the capacity of the machines.

In the case of gyratory crushers, the spider bushings must be inspected closely, for this is next to the eccentric bearing in importance. Remove all the drive belts, roll them up and put them in a dry, secure place. The eleva-

tor bucket belt should be relieved of its tension as much as possible; and, for extra long elevators or where they are exposed to the weather, it is a good plan to take off the buckets and remove the belt also. All bearings and shafting should be well oiled or greased. Finished joints or polished parts and pulley faces should be doped up. A preparation called Government slush or African slush is good for this purpose, especially when parts are exposed to the weather.

*Sweepers* should be washed all over before storing and cleaned thoroughly, including the broom. When dry all bearings, shafting, wheel boxes and spindles should be well oiled and greased. Should the broom be left on the machine, it should be lifted free of the ground to protect the fibre. New brooms should always be left in the crates or hung up until ready for use.

*Water sprinklers* should be thoroughly drained, both tank and heads. Remove the wheels and clean the boxing and spindles, grease them well and replace. Remove the spray heads and put in a secure place. Loosen the packing rings and apply a little oil to keep them soft. Oil or grease the finished parts of the valve body and wrap the same with a sack or rag to keep clean.

*Oil sprinklers* should not be put away unless you have put a few gallons of kerosene in the tank. Then drive around a little, running the pump with the spray shut off. This will clean out the inside of the tanks, pipes and pump. Pump out the kerosene before stopping. Remove the wheels, clean the boxes and spindles, grease them well and replace. See that the air pump and oil pump are well oiled or greased before leaving and drains left open so no water can collect and cause damage by freezing.

*Steam rollers* should get considerable attention when laid up for the winter. Never blow off the boiler under steam pressure or fill it again with cold water when the boiler is hot, as such treatment is likely to fracture the riveting and is otherwise dangerous, and, further, the slush will bake on the hot plates and tubes and form scale. Clean the boiler thoroughly by removing all hand-hole plates, wash out all mud or sediment, clean thoroughly outside parts which have been burned bare. Give special attention to the back head under fire door and bottom of furnace casing, as being near the ground they will rust quickly. Take special pains to paint smoke box, side plates of boiler and smokestack with a good locomotive black (linseed oil and lamp black will answer if locomotive black cannot be obtained).

Clean out fire box, smoke box and flues of all ashes and soot.

Open all drip cocks, valves, etc. Disconnect all the pipes where there is danger of freezing. Take out packing around the piston and valve rods. Take off cylinder heads and steam chest cover and coat the inside with good cylinder oil, after which replace the covers to exclude all dirt. Clean all bright parts of engine and boiler jacket. Cover with a composition to prevent rusting.

Under no consideration should the coal be left in coal bunker when roller is not in use. The corners of the coal bunker and the foot plate should be thoroughly cleaned and accumulation of coal dust removed to prevent rusting. A coat of paint (same as used on the boiler) will greatly add to the life of the coal bunker.

Remove manhole plates of the front and rear water tanks, take off the handhole covers on the bottom of the front and rear tank, scrape off all scale and wash out thoroughly; allow to dry. Then give the inside a coat of paint, using white lead and boiled linseed oil (never use boiler paint); allow the paint to dry, replace all covers, and the tanks are ready for the next season's work. If the roller is exposed to the weather, cover the top of smokestack to keep out rain and snow.

Examine the roller carefully for parts in need of repair. Drain the water tank and see to the circulating pump. No water should be allowed to remain in the pump body. Lubricate the inside of cylinder and starter pump with heavy cylinder oil to prevent rusting. Remove magneto and keep in a dry place. Clean all bright parts and cover with a composition to prevent rusting. Drain gasoline tank and carburetor.

## FORT RYAN

"A MONKEY wrench or hammer wielded in the uncertain light of the moon by one who does not love your machinery as you do, would almost drive a contractor to drink—providing there was anything to drink," writes William H. Ryan, a contractor of Jackson, Michigan, commenting upon the first installment of the article, "Preparing Machinery for Winter Storage," which appeared in the October issue of *Successful Methods*.

"Those fittings!" he continues. "They struck a responsive chord. From our experience last summer we would suggest that all brass fittings be removed every night and locked in the safe."

"Your article recalled a very precious photograph of our mixer which we are sending you under separate cover. We are not saying that we do this every year, but it was in the fall of 1915 and we were firm believers in preparedness. So we made a fort of asphalt barrels to cover the mixer."





## HE SAYS HE FELL IN

But the Records Show That Ambition and Grit Pushed G. A. McWilliams Into the Dredging Business

**"JUST** fell in, I guess," is the way George A. McWilliams describes his entry into the dredging business, and if that statement is accurate, it cannot be denied that he made a most prodigious splash. Although it all happened twenty-five years ago, the circle of ripples started by his plunge has kept right on widening until now it covers thirteen states, all within the great basin between the Alleghenies and the Rockies. Wherever there is dredging being done in Minnesota, Wisconsin, Iowa, Illinois, Indiana, Ohio, Missouri, Kentucky, Kansas, Tennessee, Arkansas, Mississippi and Louisiana, a McWilliams dredge or dragline is pretty sure to be found, working away in the muck and water, making a crooked stream straight, building a levee, or digging a drainage ditch that will convert a vast area of swamp into productive land.

A little closer analysis of the career of George McWilliams shows that he did something much more praiseworthy than merely falling into the dredging business. True, he did fall in back in 1894, but on that occasion he was financially drowned. The pulmotor, commonly known as the necessity-of-earning-a-living, brought him around, however, and after he had taken a few long breaths he deliberately plunged into the depths once more, determined this time to keep his head above the water. How well he succeeded is best told by mentioning that the McWilliams Dredging Company of Chicago and the McWilliams Company, Inc., of Memphis, Tenn., owned and controlled by G. A. and R. H. McWilliams, do more dredging work than any other organization in the country.

But to go back to the beginning. Born and raised on a Missouri farm fifty years ago, Mr. McWilliams made his way to Chicago in 1890 and went to work for McArthur Brothers, contractors. His first assignment was driving a team on a grading job, so it is pretty safe to say that he started close to the bottom of the ladder. He remained with McArthur Brothers for about four years, working during that time on the grading of the grounds for the World's Fair of 1893. By the following year he felt ready to make a little money on his own account, so with his brother he undertook a dredging job in Bureau County,

Illinois. The Green River was the object of the McWilliams attack and by the time the struggle was over the Green River had lost most of its twists and turns, and Mr. McWilliams had lost all of his money.

Back he went to Chicago, and McArthur Brothers kindly consented to put him back on the payroll. He stuck about a year, saved up some more money (the H. C. L. was not born at that time), and when he saw his chance, captured a contract for a dredging job in the Shoal Creek Drainage District at Beardstown, Illinois. One dredge was all he had, but it was enough to do the job, and when it was completed he found to his intense gratification that he had made a little money.

That was his real start. For the next fifteen years he did various dredging jobs, chiefly in Illinois, among them working along the Green River, which had swallowed up his cash a few years before. In 1910 he joined forces with his brother, who in the meantime had been doing similar work independently, and the partnership lasted until last year, when the

two companies now conducting the business were formed.

A few facts and figures about the present status of the McWilliams dredging companies will show best how much of a success has been achieved. For the last four or five years the companies always have had under contract jobs requiring the dredging of from 40,000,000 to 60,000,000 cubic yards. They own about forty-five dredges, including some of the biggest in the country, and also have under their control from fifteen to twenty dredges owned by subcontractors. As said before, their work covers thirteen states.

Good, hard work has had its share in his success, Mr. McWilliams freely admits. But he also gives considerable credit to another factor. "I have stuck to the business, I know," he said. "There have been many times when I have been tempted to branch out into other lines of work, but I have turned down all offers and kept right on in the work in which I am at home. I think the volume of work we do shows that we have succeeded fairly well. Yes, there is another thing which proves that, too. When we finish a job in one place we usually are called right back there when there is another job to be done."



GEORGE A. McWILLIAMS



## SHOVELING AWAY MOUNTAINS

Copper Mining on Big Scale in Arizona—New Type of Dump Car Developed

By Charles P. Burton

**P**ROFITING by the example of the operations in the Lake Superior iron region, the owners of the United Verde copper mine at Jerome, Arizona, decided to do their mining with steam shovels. This made it necessary to strip the overlying strata from the ore and to do this an entire mountain had to be removed.

The success of any mining property is more dependent upon the means and cost of transportation than upon the quality of the ores. For years the United Verde wasted and dumped rich copper ore, because there was no way to transport it to a smelting plant. The gold ore was roughly concentrated and smelted at the mine and transported on the backs of burros along a rough and narrow mountain trail, which led from Verde Canyon to the little fort "Whipple," near which the town of Prescott now stands; thence across the mountains to the Southern Pacific Railway at Phoenix and Maricopa.

The completion of a branch railway between Ash Fork and Phoenix now a part of the Santa Fe system hastened the development of the adjacent mining territory. This new railway was still 27 miles from the United Verde at Jerome and the only possible route across the intervening district was either through or around a series of mountains, remarkable for their resemblance to the teeth of a comb. Because of the cost, railroad officials refused even to consider the construction of this needed line, so it became necessary to build the narrow-gauge and crooked United Verde & Pacific Railway, and a standard gauge extension has just been completed, carrying the line to the



LOADING DUMP CARS AT THE UNITED VERDE MINE

new smelter at Clarkdale, only five miles distant but 2,000 ft. below Jerome.

Now, the great United Verde is being "stripped," and although underground mining will continue, the principal operations in the future will be by steam shovel. So enthusiastic have the officials become over steam shovel possibilities that they have taken a small shovel down into the mine and are operating it by compressed air with excellent results 1,200 feet below the surface.

The plan of stripping the property was originated by Robert E. Talley, assistant general manager, and the executive in charge of all the company's operations. E. E. Vanderhoef is superintendent.

Among the many problems which had to be solved was the construction of a new type of dump car. The new car had to be larger than those used on the Lake Superior iron ranges, but could be no longer because of the sharp turns it would have to make. A 25-yd. compression lock, air dump car was built to meet the conditions and it is operating successfully both at Jerome and at the Copper Queen mine at Bisbee, where another mountain, Sacramento Hill, is being picked to pieces with steam shovels and carted away in dump cars.

The larger illustration shows the operation of shoveling away a mountain at Bingham, Utah, another mining center, where the same sort of work is in progress. In the smaller photograph, what the moving picture people call a close-up, is shown of a steam shovel transferring its load to the tender care of one of the new type dump cars at the United Verde mine.



UTAH COPPER COMPANY'S MINE AT BINGHAM—THE BLACK SPECKS ON THE TERRACES ARE STEAM SHOVELS EATING AWAY THE MOUNTAIN ONE BITE AT A TIME.

## STRIPPING COAL

### How It Is Done In the Anthracite Region of Pennsylvania

By J. B. WARRINER

THE equipment required for a one-shovel operation, according to information published in the Transactions of the American Institute of Mining Engineers, is about as follows:

1 70-ton shovel.	1 steam drill.
3 18-ton locomotives.	1 water tank.
20 5-yd. dump cars.	1 boiler.
1 star drill.	1 blacksmith shop.
Necessary rails, sills, pipe lines, tools, etc.	

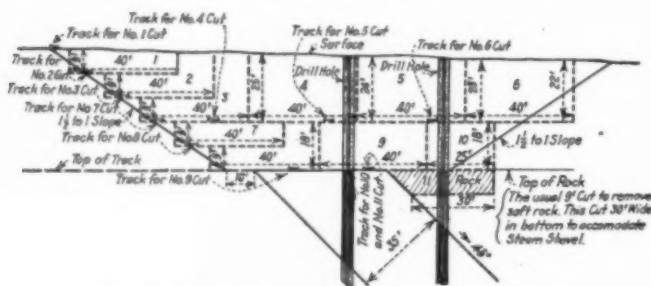
The total capital outlay for such an outfit is approximately \$30,000.

The average force required to operate a one-shovel stripping consists of about 35 men, roughly as follows:

1 foreman.	6 dumpmen.
1 shovel engineer.	1 track boss.
1 craneman.	2 trackmen.
1 fireman.	2 drillers, 8 helpers.
1 watchman.	1 boiler fireman.
2 laborers.	1 blacksmith and helper.
4 jackmen.	2 coal diggers.
3 locomotive engineers.	1 driver.
1 dump boss.	1 switchboy.

When a stripping is decided on and its limits staked out by the engineers, an inspection of the ground determines the method of opening it. Usually the cuts at the higher elevations are made first. After that the problem is almost entirely a transportation one. Steady operation of the shovel or shovels is the object to be secured. Everything must contribute to this end—tracks and rolling stock must be in good condition, turnouts must be maintained, and the grades must be as easy as the nature of the ground will permit. If in rock, drilling and blasting must be kept well in advance.

The method of opening a stripping is as follows: For the first cut the track is laid on the surface along one limit of the stripping, usually the bottom rock side, and the shovel cuts down grade alongside the track until a



METHOD OF OPENING A STRIPPING.

depth of 9 ft. is reached, this being the maximum cut that the shovel can take and load overhead. When the first cut is completed for the length of the stripping, the track is laid in this cut and the shovel again cuts down grade until a depth of 9 ft. below the first cut is reached. The shovel then continues cutting toward the other limit, the additional depth being determined by the depth of surface over the vein up to 30 ft., which is considered the proper maximum height for a clay cut. In working by the above method, it is necessary to leave a bench at least 13 ft. in width for the laying of the track. Local condi-

tions, as a rule, render it impossible to maintain any such plan for the entire life of a stripping.

The tracks to the dump are always on an ascending grade of at least 1%, though usually higher; 4% is common and grades as high as 7% have been used. The grade of the tracks in the stripping pit is governed by the necessary rise in elevation to reach the dump. The locomotives used vary in size up to 20 tons, the latter being about the heaviest type that can be used safely on a dump of any height. A 20-ton locomotive will push—

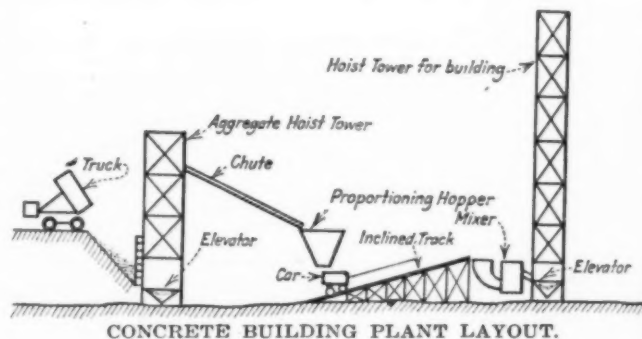
10 4½-cu. yd. cars on a 1 per cent grade.
8 4½-cu. yd. cars on a 3 per cent grade.
6 4½-cu. yd. cars on a 4 per cent grade.

The general, and best, practice for stripping tracks is to use 60-lb. rails and nothing under a No. 6 frog. Curves should be kept to under 10°, though 20 to 25° curves are used, especially in forming a dump.

Dumps are made of all heights and sizes, though there is less maintenance cost with heights of about 25 ft. Dumps of greater height settle and slip easily, especially in wet weather.

### HANDLING AGGREGATE WITH MACHINERY

A METHOD of handling aggregate, mixing concrete and hoisting used in the construction of a large concrete building in Detroit is of interest. The H. G. Christman Company of that city has developed the system shown in the illustration. In this system a truck dumps into a



hopper which discharges into an aggregate elevator. The material is elevated and conveyed by an incline as shown to a proportioning hopper. Cars running on an inclined track are loaded from this hopper and dumped into the mixers. The mixed concrete is raised in a tower elevator in the usual manner.

This arrangement has been used with success and is an example of the possibilities in developing mechanical methods of handling material from the time it is delivered on the job until it is placed in the forms.

### REPAINTING OLD STEEL BRIDGES

The Iowa Highway Commission has found that 1 gal. of good quality paint will cover 1,100 sq. ft. of steel surface or about 5 tons of fabricated metal; 1 gal. of sublimed white or blue lead paint will cover 700 sq. ft. of steel surface or about 3.5 tons of fabricated metal. The cost of sandblasting to remove old paint is about \$1.50 per ton of metal which includes a rental charge on equipment. Sand blasting equipment costs from \$500 to \$700, depending upon the type selected.



## MATERIAL REQUIRED FOR MINNESOTA ROADS

## Less Thickness Necessary With Machine Tamping

THE latest specifications and instructions issued by the Minnesota Highway Commission give specific requirements as to materials.

The following table gives the various amounts of material required for different types of pavement:

	MACHINE TAMPED				
	Concrete	Asphaltic Concrete	Brick	Brick Mortar Bed	Road Cement Bed
Depth concrete, in. . . . .	6½-7½	5½	4½	¾	¾
Cu. yds., per sq. yd. . . . .	.1992	.1583	.1296	.0052	.0208
Mix. . . . .	1-2-4	1-2½-5	1-2½-5	1-2	1-3
Material per Sq. Yd.					
Cement, bbls. . . . .	.30	.20	.16	.017	
Sand, cu. yds. . . . .	.09	.07	.06	.006	
Stone, cu. yds. . . . .	.18	.15	.12	...	

	HAND TAMPED			Brick Mortar Bed	Road Cement Bed
	Concrete	Asphaltic Concrete	Brick	¾	¾
Depth concrete, in. . . . .	7-8	6	5		
Cu. yds., per sq. yd. . . . .	.2126	.1722	.1436	.0052	.0208
Mix. . . . .	1-2-3½	1-2½-4	1-2½-4	1-2	1-3

Material per Sq. Yd.					
Cement, bbls. . . . .	.343	.24	.21	.017	
Sand, cu. yds. . . . .	.107	.09	.07	.006	
Stone, cu. yds. . . . .	.17	.14	.12	...	

18 ft. pavement—200 sq. yd. a sta., 10,560 sq. yd. a mile.  
20 ft. pavement—22.22 sq. yd. a sta., 11,753.33 sq. yd. a mile.

It is interesting to note the difference in thickness required for machine and hand tamping. At ordinary prices this difference represents a saving of about \$2,000 in material alone on a 5-mile road job.

## SERVICE HINTS

## PORTABLE TOOL WAGON

THE portable tool wagon illustrated has some interesting features and it can be made by any skillful carpenter. The body is built with two compartments, one at the front end for tools that must lie flat and one at



A HANDY TOOL WAGON.

the rear end, in which a man can stand erect, which is used to store a variety of tools.

Almost any kind of tools can be stored in a wagon of this type. The box is mounted on the running gear of an ordinary wagon and is notched near the front end so that the front wheels can cut under in turning.

## HORSE PUSH SCRAPER SMOOTHS FILL

A push scraper has been found an effective tool for leveling the edges of fills. The arrangement consists of a long piece of timber across the axle and front wheels removed from a wagon. The rear end of the timber is counterweighed and the front end carries a plank scraper. The horses are hitched midway of the timber and are alternately backed up and driven ahead, pushing the dirt over the edge of the fill in the forward motion.

## A TRAVELING BIN

A LOADING bin that moves is something rather out of the ordinary. A. Guthrie & Co., contractors of St. Paul, Minn., are loading gravel near Wabasha with a traveling derrick and clamshell bucket into the bin shown in the illustration. As it becomes necessary for the derrick to move along the pit, the loading bin is able to keep pace with it.

The bin has a capacity of about 40 cu. yd. and is used in loading a train of wagons, each of which holds 5 cu. yd. Two bin gates are provided in the bottom of the bin so that both ends of the wagons can be loaded at the same time. It is unnecessary to move the train except to put another wagon under the gates. In moving the bin 10 by 10 in. sills are laid with blocking under them and



NOTE THE ROLLERS.

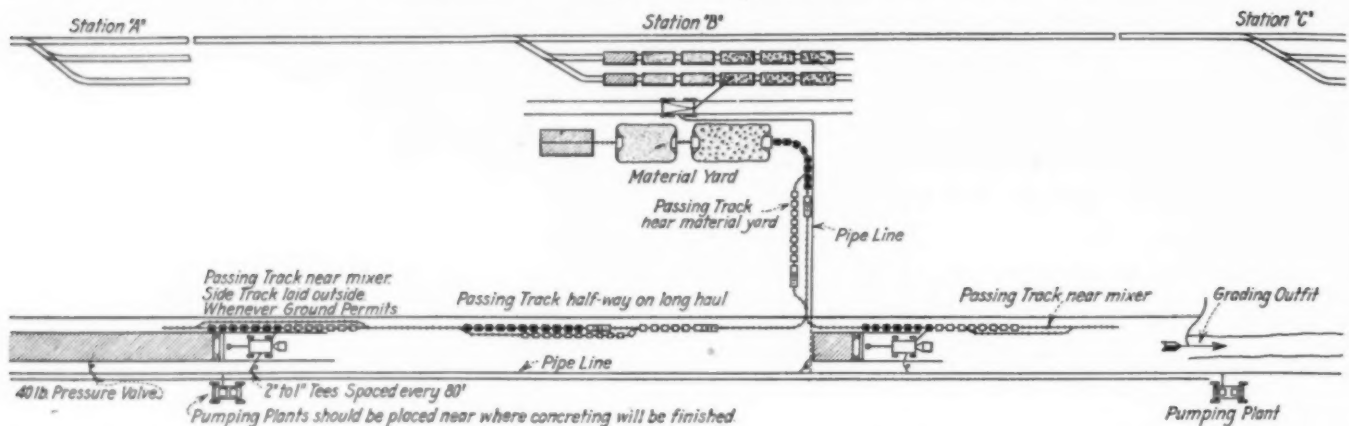
the bin is pulled forward. The rollers are 6 in. in diameter and they are fed under at intervals of about 3 ft. as the bin moves forward.

A somewhat similar type of rolling bin has been successfully used for handling concrete aggregate, and has proved its efficiency.



## ROAD PLANT LAYOUT

How An Equipment Should Be Arranged for a Concrete Job



EACH job has its own particular features that control the method of laying out the plant. In general, however, it always is necessary to provide unloading and storage facilities and track and passing tracks.

In the plant layout shown, several interesting features will be noted. This is a two-mixer job, and grading

is going on simultaneously with the laying of the concrete. Storage piles and tunnel traps are used, loaded trains being handled on two passing tracks near the material yard. It is usually necessary to provide passing tracks between the mixer and the material yard on long hauls and always a passing track near the mixer.

## MACHINES DIG DETROIT SEWERS

Contractors on Eight Important Jobs Use Efficient Methods

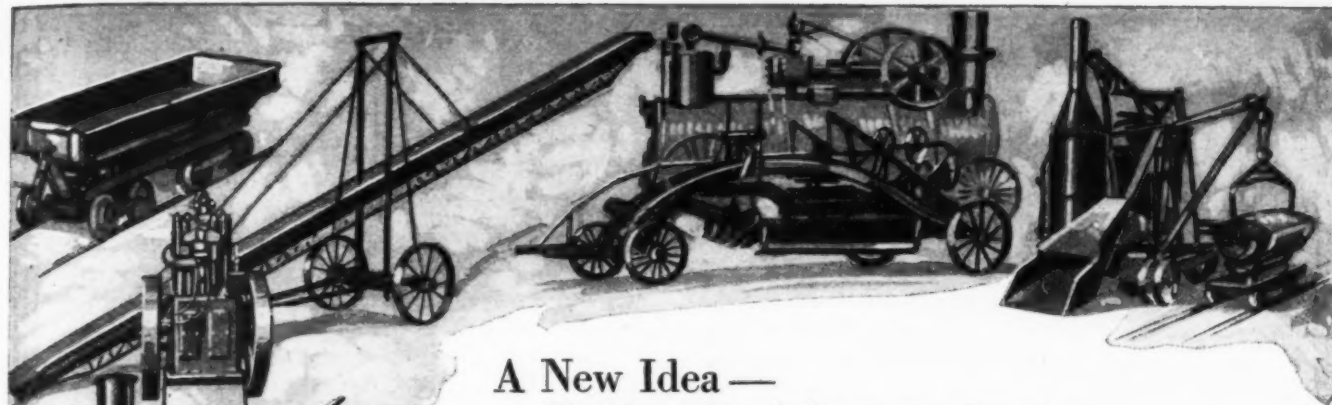
THE city of Detroit has an immense sewer project under way to complete the sewer system of that city. At the present time some of the work is being done by the contractors listed in the accompanying table. The character of work, the number of men employed and the average wages of labor also are shown. All of this work is being done on a lump sum contract basis and good progress is being made in spite of adverse conditions.

It will be noted that nearly all the contractors are

using mechanical methods of handling the work, and a most interesting assembly of all the different types of machinery for doing sewer work is to be found there. A study of the table will show some of the different methods in use.

Something over \$7,000,000 has been let in contracts up to the present time and several millions more will be expended in the near future. C. W. Hubbell, city engineer, has general charge of the work.

Job	Contractor	Type	Amount of Contract	Length Feet	Avg No. of Men	Avg Wage Labor Per Hr.
Lonyo Road (Min. Grade .05%)	Walbridge & Aldinger Co. Chi.	Open Cut Open Cut Concr. 3'	\$ 1,430,000	8300	65	.50 to .95
Weatherby (Min. Grade .05%)	Nash Bros. Chicago	5 Centered Arch Open Cut - Concr.	\$ 990,478	10,500	34	.55 to 1.25
Dexter (Min. Grade .24%)	William Porath Detroit	5'-6" cyl. 2 ring Brick Tunnel	\$ 136,539	7956	21	.55 to .90
Linwood (Min. Grade .12%)	Jaynes & Affeld Detroit	3 Ring brick and concrete Tunnel Machines 7' to 9' Cylinders	\$ 279,453	11,929	45 - 47 - 8	.65 to 1.25 .55 to 1.25 .65 to .95
Lynch (Min. Grade .08%)	Sec. 1 Geo. R. Cook Sec. 2 Carpenter Const. Co. Detroit	4 Ring Brick to smaller open cut and Tunnel	\$ 389,948 \$ 260,192	25,220	36 - 52 - 12 - 11	.55 to 1.25 .60 to 1.10 .65 to .90 .65 to .90
Hart Ave. (Min. Grade .03%)	J. M. Affeld Detroit	20" Tile Hand work tunnel and Open Cut	\$ 17,252	2,854	8	.75 to 1.10
Erwin	R. D. Baker Detroit	4'-9" and 5' Cylinders Concrete	\$ 48,520	2,859	17	.60 to .90
Alter Road	J. M. Affeld Detroit	5'-6" Cylinder Brick and Concr. Tunnel	\$ 77,040	4,876	38	.60 to 1.00



**A New Idea —  
To Render Adequate Service  
To Construction Machinery Users  
—At Home and Abroad**

**T**HE manufacturers whose advertisements appear in this magazine realize the necessity of giving the same high standard of service to users of their machinery abroad that buyers at home expect as a matter of course. They desire to avoid the difficulties which arise from marketing highly specialized machinery of this kind through small export jobbers or general exporting commission houses, handling a great variety of commodities and manufactured products. They have, accordingly, joined together in a common export department—

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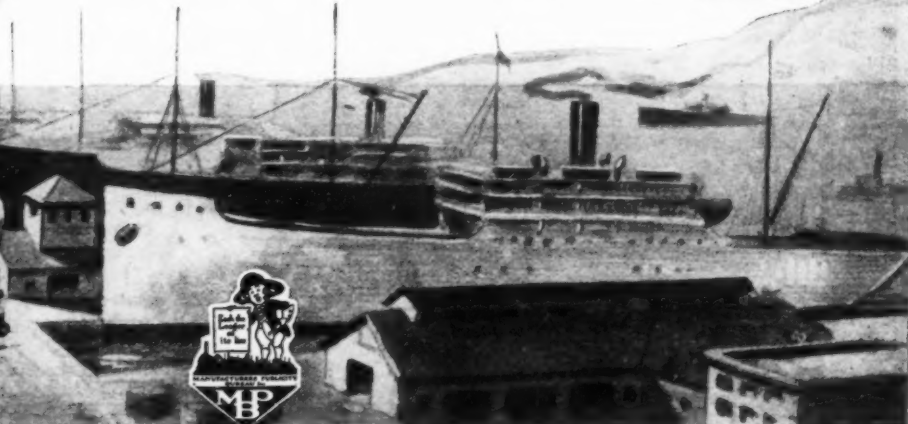
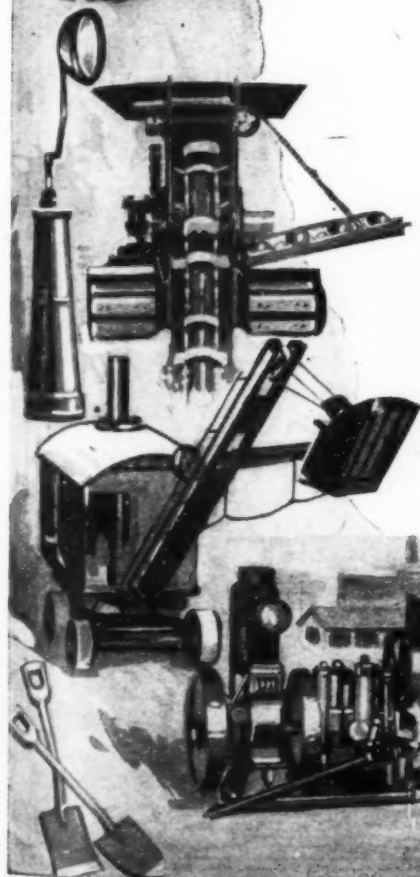
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## Troubled by Lack of Men?

**I**F YOU have trouble not only in *getting* men for your material-handling work but also in *keeping* them "on the job," you should investigate the possibilities of the most efficient labor-saving machinery.

In use in many sections of the country and proving, wherever used, a revelation to contractors who just now are harried by the worry of trying to keep enough men on the job to carry it to completion, the

## B-G Self-Feeding Bucket Loader

is successfully filling the labor-breach.

In many instances B-G Loaders operated by one man are replacing a dozen men with shovels.

The Patented Bucket-Feeding Device (shown in insert below) is a distinctive B-G feature. It consists of two horizontal steel discs (set close to the ground) which cut under the piles of material and, revolving inward towards the buckets, convey the material to them.

If you are contemplating a job where you will be handling coal, coke, sand, gravel, crushed stone or similar materials you should learn about the efficiency of this B-G Loader.

If you overlook learning about it you will have ample cause to regret it later when you think of the time it would have saved you and the labor-scarcity bugbear it would have eliminated.

*Write for complete information*

## BARBER-GREENE COMPANY

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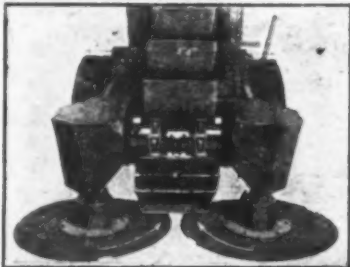
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*Canadian Agents — Mussels Limited, Montreal, Toronto, Winnipeg, Vancouver*



Another labor-saving device is the B-G Conveyor. B-G Standardized Conveyors are made in several styles and capacities—ranging from portable type (12 to 60 feet) and stationary type (in any length)—equipped with electric drive; supplied with gasoline engine when required—operation costs low—working capacity up to 150 tons per hour. Write for information.



EXPORT DEPARTMENT  
ALLIED MACHINERY COMPANY OF AMERICA  
17 CHANDLER ST. NEW YORK 6 N.Y. CABLE: BARBER-GREENE



## Replace Expensive Man-Labor!



**YOU** SIMPLY have to face this fact—high wages have come to stay. Right now you are paying more for common labor than you have ever paid before.

Every man—shoveler, wheelbarrow-handler or what—you keep on your pay roll that can be replaced by a material-handling machine, will continue to be a sapper of your profits.

You can easily solve this difficulty as well as the labor-scarcity problem, and at the same time show a bigger profit on your books, by using the

### B-G Standardized Conveyor

This efficient labor-saving machine does the work quicker, with less damage in handling and at a reduction of 50% to 90% in costs.

Singly or in combination they will eliminate 3 to 20 men from your pay roll. With B-G Conveyors on the job you will never face the possibility of their "going on strike."

B-G Conveyors handle coal, coke, cement, gravel, cinders, brick, crushed stone, ashes—in fact, all sorts of package and bulk materials.

B-G Standardized Conveyors are Belt Conveyors—soundly built—portable type (12 feet to 60 feet) and stationary type (in any length)—equipped with electric drive; supplied with gasoline engine when required—operation costs low—working capacity up to 150 tons per hour.

*Our Service Department will be glad to advise you in regard to the B-G Conveyor exactly suitable to your needs. Write for interesting literature on this unusually capable labor-saving machine.*

## BARBER-GREENE COMPANY

585 West Park Avenue, Aurora, Illinois, U. S. A.

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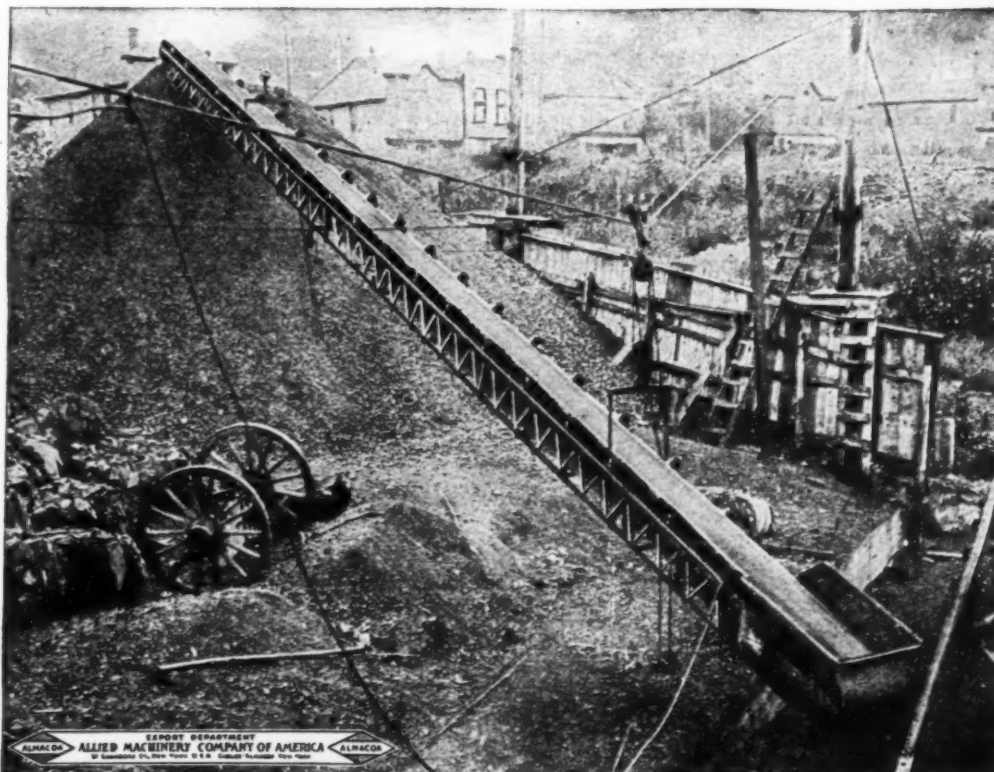
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*Canadian Agents — Mussels Limited, Montreal, Winnipeg, Toronto, Vancouver*

*Another labor-saving device is the B-G Self-Feeding Bucket Loader. This Bucket Loader is designed for severe service in handling heavy loads. The big feature is its Rotating Disc Feeder (Patented.) The disc rotates and carry material to the center where it is picked up by the buckets. The quickest and easiest method of loading material. Write for information.*



EXPORT DEPARTMENT  
ALLIED MACHINERY COMPANY OF AMERICA  
30 Broadway, New York, N. Y. U. S. A. Catalogue November 1919

**Mortar Mixer** *for brick work. Takes the place of the old fashioned hoe and mixing box. Will supply mortar for 40 brick-layers, and deliver a solid and putty-like mortar no waste on the wall. Ask for Bulletin No. 3.*

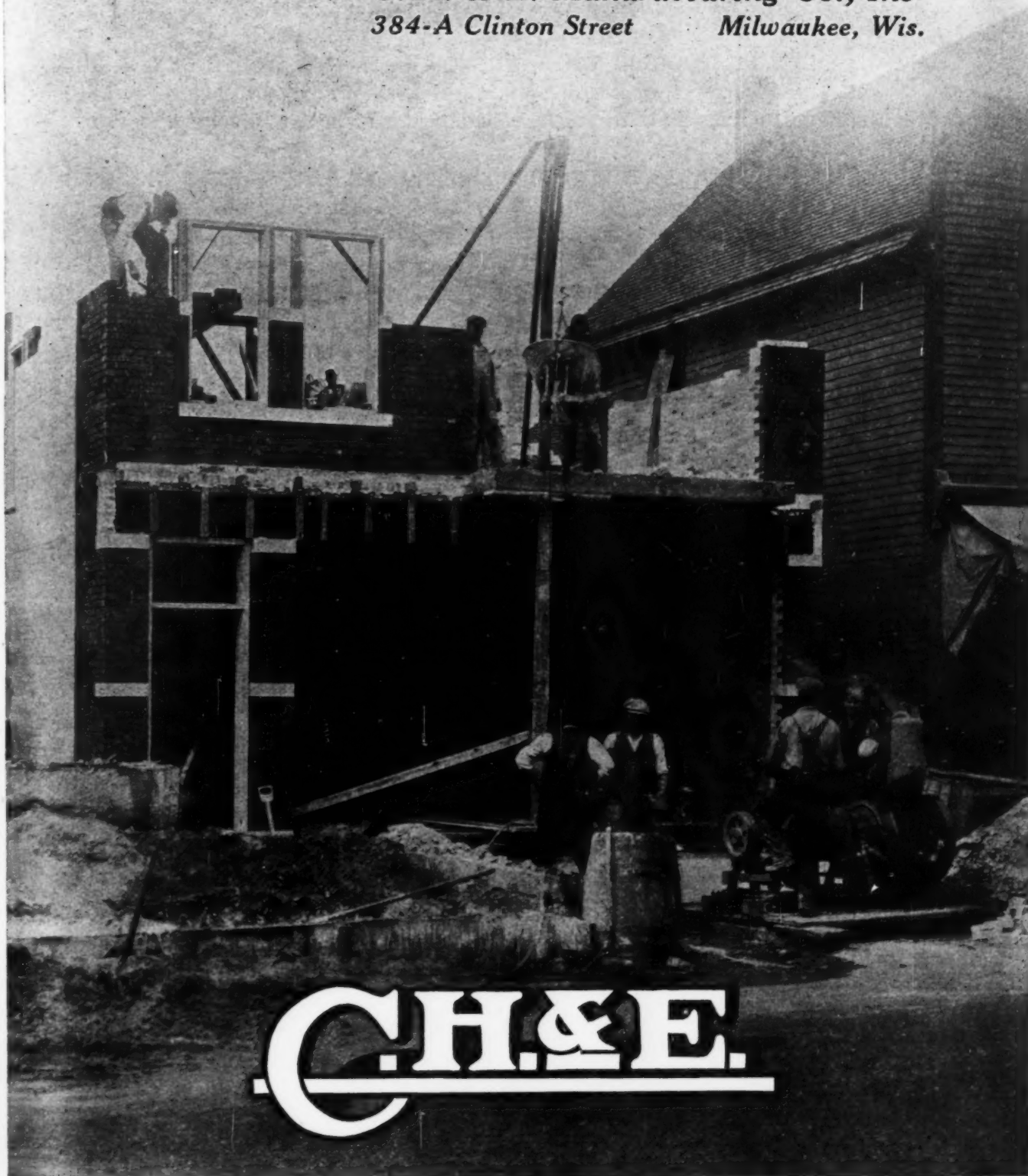
**C. H. & E. Manufacturing Co., Inc.**  
384-A Clinton Street      Milwaukee, Wis.





**Builders' Hoist** *either kerosene engine or electric motor driven. Outfit is double acting in its action; for operating a double cage Material Elevator. Gears are of heavy construction, and outfit is simple to operate. Ask for Bulletin No. 3.*

**C. H. & E. Manufacturing Co., Inc.**  
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**CH&E.**



# From Start To Finish

## *Rapid, Steady Excavating*

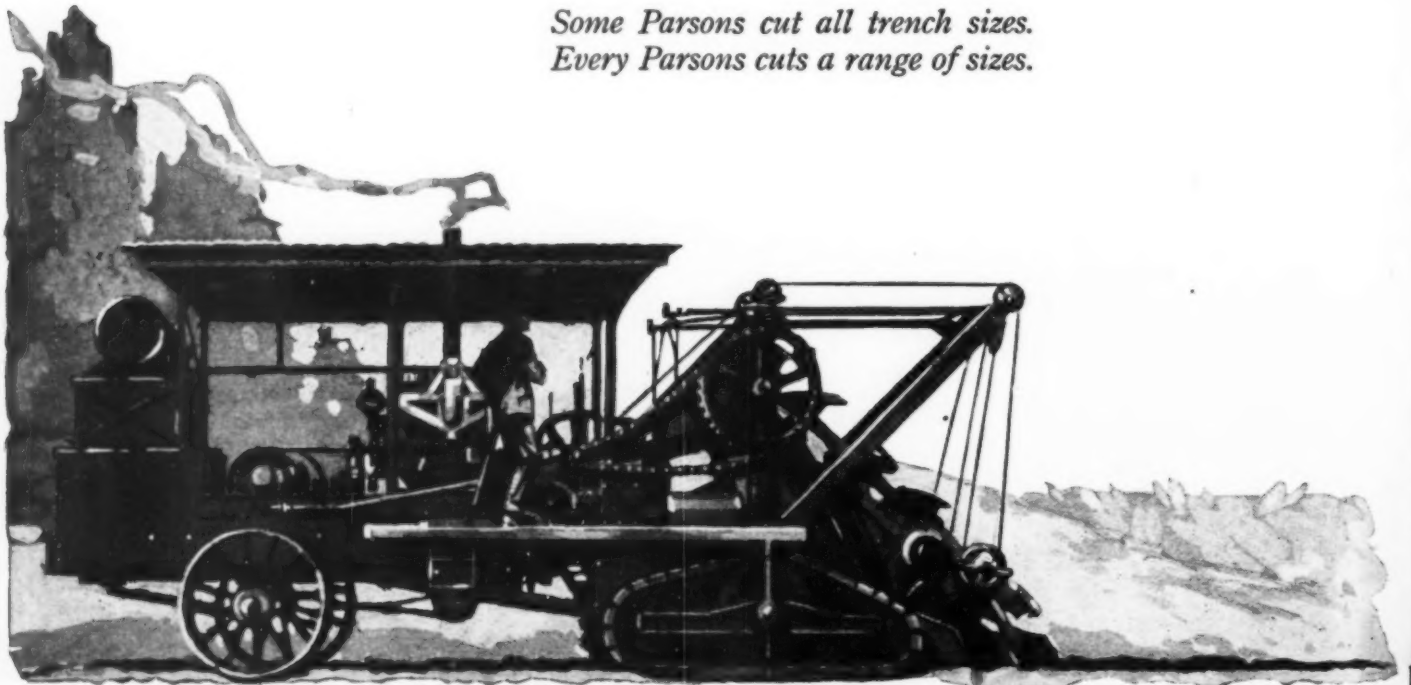
Everyone with trench excavating to do should know the points which have won top-place for Parsons equipment.

No matter whether you want to cut a deep trench or a shallow one; a wide trench or narrow; a straight-away or curved trench, you will find a Parsons Excavator the sure, economical and speedy machine to use.

Parsons Excavators are the "He-Men" of Excavators. Made with the inbred stamina and *extra-strength* for the hardest jobs—not equipped only for the average task.

Take such features as the Positive Bucket cleaning Device or the Short Route Delivery or any of the other Parsons advantages. They mean more work -- better work. Our booklet shows why.

*Some Parsons cut all trench sizes.  
Every Parsons cuts a range of sizes.*



## The Parsons Company

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ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA  
51 Columbus St. New York, U.S.A. Circulars Almacoa New York

# ish Of The Trench

## *Economical, Sure Back-Filling*

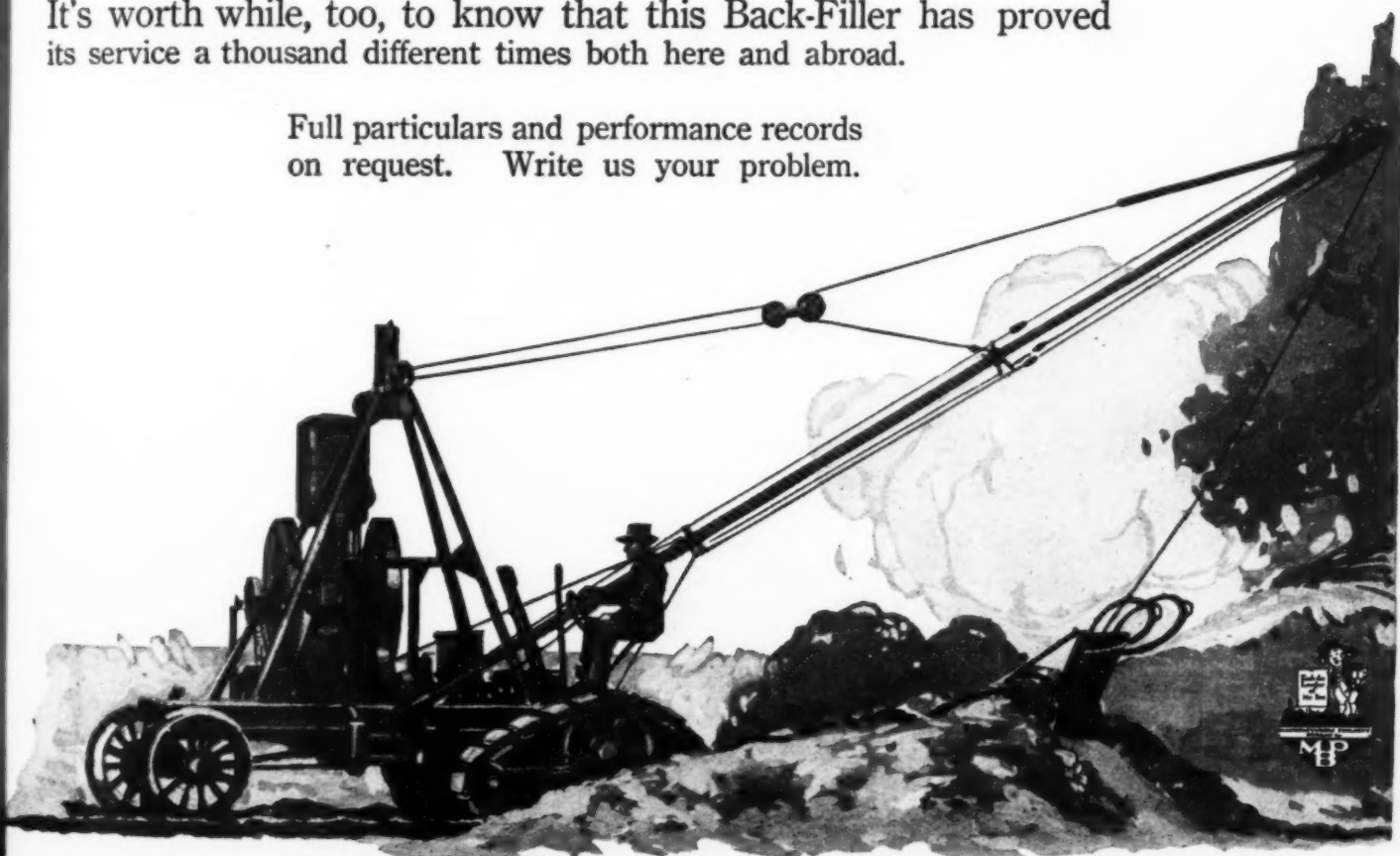
Coupled with the necessity for excavating is the need for a quick, reliable method of filling-in the trench. To meet this need — the Parsons Back Filler.

A one-man machine, sturdy and compact in design, conveniently arranged in every detail.

When your cost figures are compared with those of users of the Parsons Back-Filler you will find yourself with no argument against its use.

It's worth while, too, to know that this Back-Filler has proved its service a thousand different times both here and abroad.

Full particulars and performance records  
on request. Write us your problem.



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# Always A Step Ahead

## No Experiments for You—

The line of Austin Power Rollers is complete. And more — *it is the proved line.* No experiments for you — no untried machines; not even unproved parts.

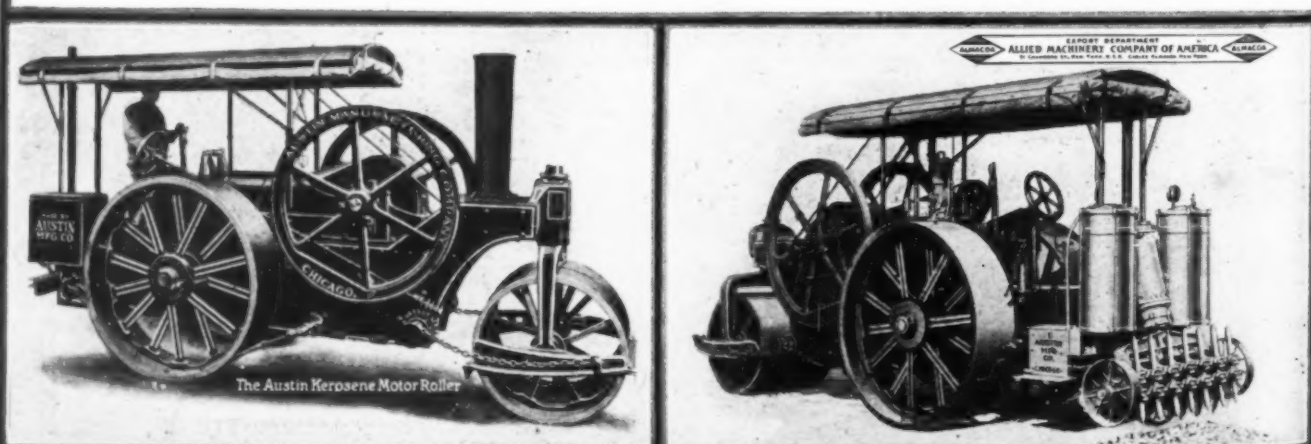
Austin made the first motor roller in America; since that date Austin rollers have proved themselves in service in every corner of the world.

Play safe—get a *dependable* motor roller; a roller which is always a step ahead in design.

## The Austin-Western Chicago

New York  
Albany  
Boston  
Philadelphia

Richmond  
Charleston (W. Va.)  
Columbus  
Louisville  
New Orleans



# Four Types of Austin Rollers

# With Austin Power Rollers

*Always the Latest and Best*

**MOTOR ROLLER**—made in five sizes—7 to 15 tons. Two speeds—steel gearings—practical self-starting device—simple ignition; no coils or batteries.

**TANDEM ROLLER**—the paving contractor's "first aid to profits." Steady running—low center of gravity yet with high road clearance—easily controlled—power steering—low operating cost.

**STEAM ROLLER**—truly the leader of its line—it is the *modern* steam roller. Ample boiler—extra large heating surface and steam space—boiler and cylinders independently mounted on base—these are only a few of the reasons why you should send for "Roller Facts and Performances."

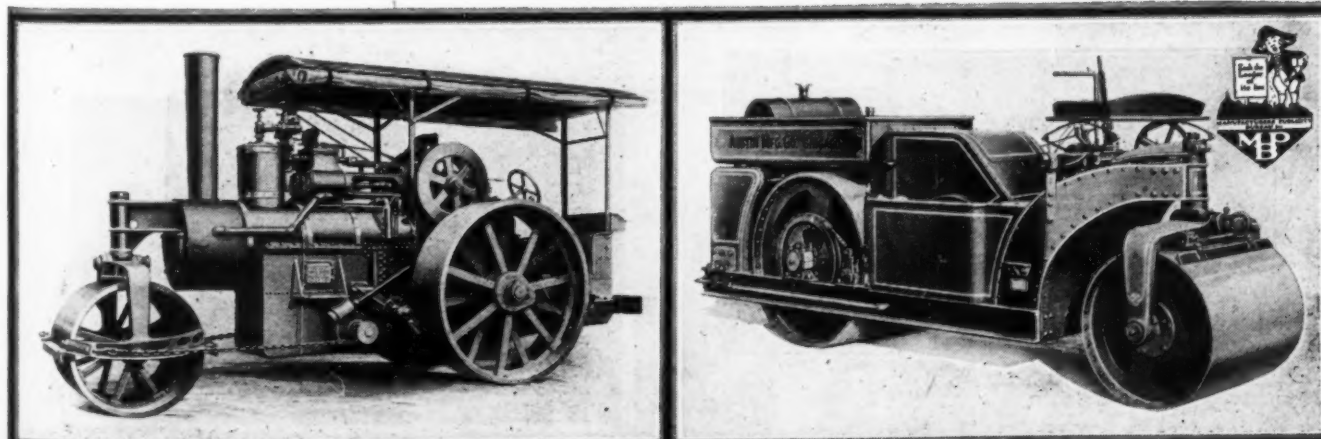
*Scarifier Attachment* for use with Austin Steam or Motor Rollers—10 ton or larger sizes.

## Road Machinery Co.

### Illinois

Jackson  
Dallas  
Oklahoma City  
Memphis  
Nashville

Atlanta  
Los Angeles  
St. Paul  
Portland  
San Francisco



## One For Every Road Rolling Need

# Some Austin-Western

## *Each for Certain Conditions*

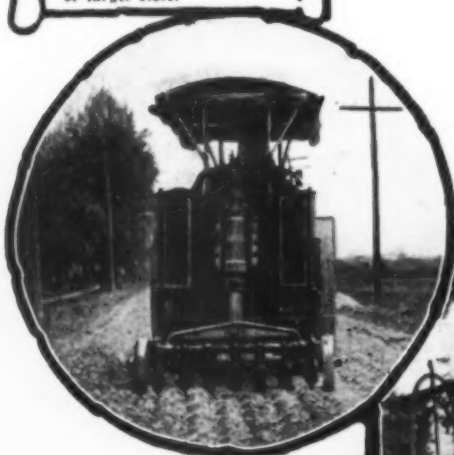
SOME road builders — even old hands at the game — think there's only one type of scarifier — only one way to do all jobs.

We show here three Austin-Western machines; each particularly suited to certain conditions and each the most efficient at its own kind of work.

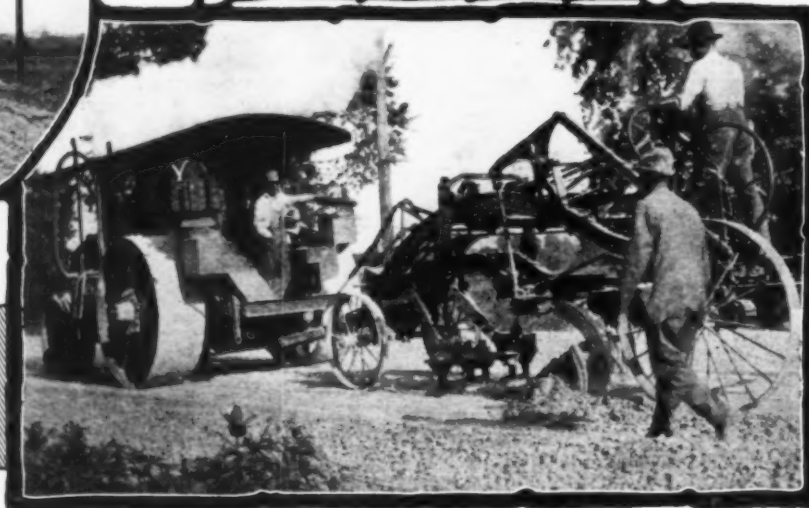
### The Austin-Western Chicago

New York	Richmond
Albany	Charleston
Boston	(W. Va.)
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The Austin Attached Scarifier operated and controlled by the roller man on an Austin Steam or Motor Roller, 10-ton or larger sizes.



The Austin Self Scarifier cuts and grades in one operation. Scarifier and grader may be used together or each independently, all controlled by the operator. The proper tool for cutting old road beds; will tear out an old stone road and stand up to the heaviest traction engine.



EXPORT DEPARTMENT  
ALHACOA ALLIED MACHINERY COMPANY OF AMERICA ALHACOA  
25 Broadway, New York, N.Y. - General Offices, New York



# Methods of Scarifying

## *Each the Best for its Job*

**I**T pays big to fit the machine to the job; not the job to the machine. It pays in work well done and quickly done; in time and money saved.

Write to us for detailed information covering the work each of these scarifiers can do for you; learn for yourself how Austin-Western methods will help you in your work. Ask for scarifier facts.

### Road Machinery Co.

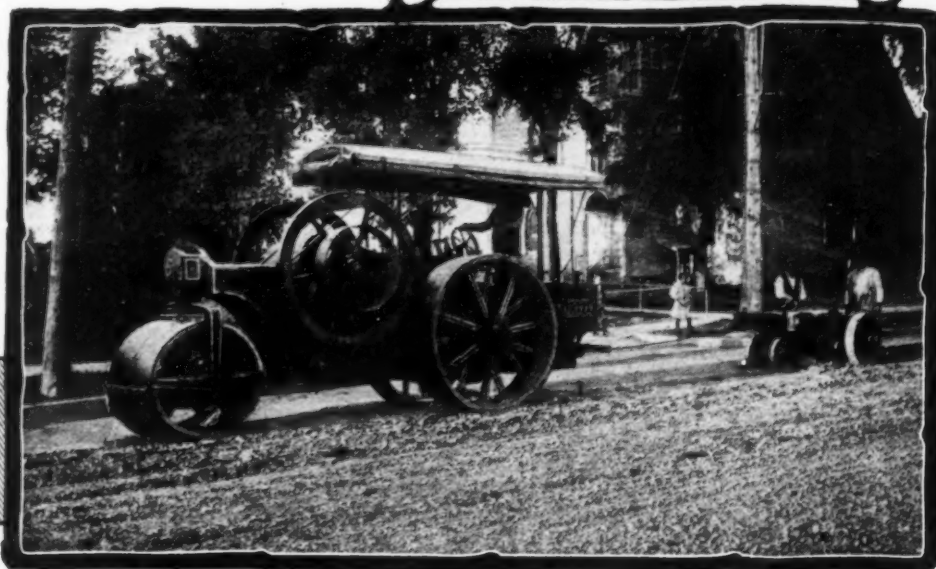
#### Illinois

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Note this Austin Steerable Scarifier. Can be used in conjunction with an Austin or Western Grader. Hauled by power roller or ordinary sized tractor.





## This Portable Crushing Outfit Crushes-Screens-Loads *Saves Money-Speeds Work* *Four Reasons Why*



- 1—Haulage costs cut at both ends. Crush your stone right where you want it.
- 2—Folding elevator can be raised or lowered into position by one man in a few moments without trouble.
- 3—Cuts labor costs—either rock or gravel crushed and screened and put in bins ready for loading. Practically automatic—labor reduced to a minimum.
- 4—The famous *Aurora Two-Blow-Stroke* Crusher increases production and reduces vibration by reason of its patented feature of striking two blows on the stone to every revolution of the crankshaft.

**The Aurora**  
"Two-Blow-Stroke" Crusher

See the phantom view below showing the entire operation of crusher  
For detailed information ask for Crusher folder

**THE AUSTIN-WESTERN ROAD MACHINERY CO.**  
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Philadelphia	Columbus	Oklahoma City	Atlanta
San Francisco	Louisville	Los Angeles	Portland

